Georgia Standards of Excellence Curriculum Frameworks

Mathematics

GSE Kindergarten

Unit 3: Sophisticated Shapes

Georgia Department of Education

Richard Woods, Georgia's School Superintendent

"Educating Georgia's Future"

Kindergarten Unit 3: Sophisticated Shapes

TABLE OF CONTENTS

IF YOU HAVE NOT READ THE KINDERGARTEN CURRICULUM OVERVIEW IN ITS ENTIRETY PRIOR TO USE OF THIS UNIT, PLEASE **STOP** AND CLICK HERE: https://www.georgiastandards.org/Georgia-Standards/Frameworks/K-Math-Grade-Level-Overview.pdf

Return to the use of this unit once you've completed reading the Curriculum Overview. Thank you.

OVERVIEW

The Overview is designed to bring focus to the standards so that educators can use them to build their curriculum and to guide instruction.

Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

For more detailed information about unpacking the content standards, unpacking a task, math routines and rituals, maintenance activities and more, please refer to the Grade Level Overview.

STANDARDS FOR MATHEMATICAL PRACTICE

The standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The statements provided offer a few examples of connections between the Standards for Mathematical Practice and the Content Standards of this unit. The list is not exhaustive and will hopefully prompt further reflection and discussion.

Students are expected to:

1. **Make sense of problems and persevere in solving them.** Students will make sense of shapes in their world by recognizing, building and creating new shapes.

2. **Reason abstractly and quantitatively.** Students will use numerals to refer to number of sides while observing pictures of shapes and recognize that combining shapes can change the number of sides.

3. **Construct viable arguments and critique the reasoning of others.** Students can clearly express, explain, organize and consolidate their ideas about shapes while composing and decomposing them.

4. **Model with mathematics.** Students will begin to represent shapes in their world by using drawings or objects.

5. **Use appropriate tools strategically.** Students will explore the use of tools (solid shapes, virtual shapes) to explore geometrical solids in the world around them, whenever appropriate.

6. **Attend to precision.** Students will express their ideas and reasoning while using appropriate math vocabulary in regards to the shapes and their attributes.

7. **Look for and make use of structure.** Students will recognize patterns while exploring for shapes such as triangles can be different sizes or colors and still be called a triangle.

8. **Look for and express regularity in repeated reasoning.** Students will begin to notice that as the number of sides increase on a shape, a new shape is created (triangle has 3 sides, a rectangle has 4 sides, a pentagon has 5 sides and hexagon has 6 sides.)

(For descriptors of standard cluster please see the Grade Level Overview)

*****Mathematical Practices 1 and 6 should be evident in EVERY lesson*****

STANDARDS FOR MATHEMATICAL CONTENT

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

MGSEK.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to*.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Analyze, compare, create, and compose shapes.

MGSEK.G.4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6. Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

Classify objects and count the number of objects in each category.

MGSEK.MD.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

(Refer to grade level overview for unpacked standards)

Geometry Trajectory –*Putting It All Together*

Each concept builds on the previous idea and students should explore and construct concepts in such a sequence

VAN DE WALLE	**Level 0 *Kindergarten Level** **Visualization** **The object of thought (focus) is individual shapes.** **– Students are operating on specific examples of the shapes they see.** **– Orientation may even change what a student observes.** **– The goal is to see likenesses and differences.**	**Level 1 Analysis** **The object of thought is classes of shapes.** **– Students consider all shapes in a class instead of an individual example.** **– What makes a shape "a shape"?** **The outcome is discovering properties of shapes.** **– Focus on properties.** **– Apply ideas to entire classes of figures.**	**Level 2 Information Deduction** **The objects of thought are the properties.** **– Students understand that properties are related.** **– One set of properties may relate to another property.** **– Students can understand logical reasoning about the properties.** **The outcomes are relationships among properties.**	**Level 3 Deduction** **The objects of thought are the relationships among the properties.** **The products of thought are the deductive axiomatic systems.**	**Level 4 Rigor** **The objects of thought are the deductive axiomatic systems.** **The products of thought are comparisons and contrasts among different axiomatic systems of geometry.**

Adapted from the *van Hiele Levels of Geometric Thought* and taken from van de Walle & Lovin *Teaching Student-entered Mathematics (k-3)*

The Big Picture in Kindergarten

The Big Picture in Kindergarten

BIG IDEAS

In this unit, students will:

- Recognize, name, build, draw, compare, and sort simple two- and three-dimensional shapes, describe attributes and parts of two- and three-dimensional shapes, group objects according to common properties, investigate and predict the results of putting together and taking apart simple two- and three-dimensional shapes, describe, name, and interpret relative positions in space and apply ideas about relative position, create mental images of geometric shapes using spatial memory and spatial visualization;
- Recognize and represent shapes from different perspectives, recognize geometric shapes in the environment, create and extend patterns, investigate and predict the results of putting together and taking apart two and three-dimensional shapes, pose information questions, collect data and organize and display results using objects, pictures and picture graphs.

Big Ideas include the following:

- Properties determine when shapes are alike or different.
- Geometry helps us describe, represent, and make sense of our environment.
- Shapes are everywhere.
- All objects have a shape with a specific name.
- Shapes have sides and angles which can be counted.
- Objects can be similar to others in one way and different in other ways.
- Patterns can be created and extended using geometric shapes.
- Words can be used to describe the location of an object.
- Some shapes are flat (2 dimensional) while other shapes are solid (3 dimensional).
- Smaller shapes can be used to compose larger shapes and larger shapes can be decomposed to from smaller shapes

ESSENTIAL QUESTIONS

- How can we describe the location or position of an object or shape?
- How can we describe shapes in our everyday lives?
- What makes shapes different from each other?
- How can shapes be sorted?
- What makes shapes different from each other?
- How can we use words that describe location in our everyday lives?
- How are shapes alike and different?
- How are quadrilaterals and triangles different?
- How can we describe the position of a shape?
- Where can we find shapes in the real world?

- How can a shape be described?
- What is an attribute?
- What are some attributes of a flat shape? Solid shape?
- How do shapes fit together and come apart?

CONCEPTS/SKILLS TO MAINTAIN

Although many students may have attended pre-school prior to entering kindergarten, this is the first year of school for some students. For that reason, no concepts/skills to maintain will be listed at this time. It is expected that teachers will differentiate to accommodate those students that may enter kindergarten with prior knowledge.

STRATEGIES FOR TEACHING AND LEARNING

Develop spatial sense by connecting geometric shapes to students' everyday lives. Initiate natural conversations about shapes in the environment. Have students identify and name two- and three-dimensional shapes in and outside of the classroom and describe their relative position. Ask students to find rectangles in the classroom and describe the relative positions of the rectangles they see, e.g. *This rectangle (a poster) is over the sphere (globe)*. Teachers can use a digital camera to record these relationships. Hide shapes around the room. Have students say where they found the shape using positional words, e.g. *I found a triangle UNDER the chair*. Have students create drawings involving shapes and positional words: *Draw a window ON the door* or *Draw an apple UNDER a tree*. Some students may be able to follow two- or three-step instructions to create their drawings.

Use a shape in different orientations and sizes along with non-examples of the shape so students can learn to focus on defining attributes of the shape. Manipulatives used for shape identification actually have three dimensions. However, Kindergartners need to think of these shapes as two-dimensional or "flat" and typical three-dimensional shapes as "solid." Students will identify two-dimensional shapes that form surfaces on three-dimensional objects. Students need to focus on noticing two and three dimensions, not on the words *two-dimensional* and *three-dimensional.*

Use shapes collected from students to begin the investigation into basic properties and characteristics of two- and three-dimensional shapes. Have students analyze and compare each shape with other objects in the classroom and describe the similarities and differences between the shapes. Ask students to describe the shapes while the teacher records key descriptive words in common student language. Students need to use the word *flat* to describe two-dimensional shapes and the word *solid* to describe three-dimensional shapes. Use the sides, faces and vertices of shapes to practice counting and reinforce the concept of one-to-one correspondence.

The teacher and students orally describe and name the shapes found on a Shape Hunt. Students draw a shape and build it using materials regularly kept in the classroom such as construction paper, clay, wooden sticks or straws.

Students can use a variety of manipulatives and real-world objects to build larger shapes with these and other smaller shapes: squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres. Kindergarteners can manipulate cardboard shapes, paper plates, pattern blocks, tiles, canned food, wooden or foam blocks, and other common items. Have students compose (build) a larger shape using only smaller shapes that have the same size and shape. The sides of the smaller shapes should touch and there should be no gaps or overlaps within the larger shape. For example, use one-inch squares to build a larger square with no gaps or overlaps. Have students also use different shapes to form a larger shape where the sides of the smaller shapes are touching and there are no gaps or overlaps. Ask students to describe the larger shape and the shapes that formed it.

SELECTED TERMS AND SYMBOLS

The following terms and symbols are often misunderstood. These concepts are not an inclusive list and should not be taught in isolation. However, due to evidence of frequent difficulty and misunderstanding associated with these concepts, teachers should pay particular attention to them and how their students are able to explain and apply them.

Teachers should present these concepts to students with models and real life examples in discussions with students. Students should understand the concepts involved and be able to recognize and/or demonstrate them with words, models, pictures, or numbers.

- above
- attribute
- behind
- below
- beside
- circle
- classify
- compose
- cone
- cube
- cylinder
- describe
- in front of
- inside
- left
- property
- next to
- number
- numeral
- outside
- rectangle

- right
- set
- sphere
- square
- triangle

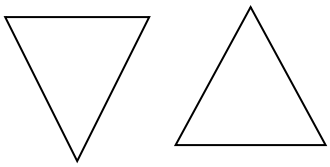
Mathematics Glossary

COMMON MISCONCEPTIONS

Students often use incorrect terminology when describing shapes. For example, students may say a cube is a square or that a sphere is a circle. The use of two-dimensional shape names that appear to be part of a three-dimensional shape in order to name the three-dimensional shape is a common mistake. For example, students might call a cube a square because the student sees the face of the cube. Work with student to help them understand that the two-dimensional shape is a part of the object, but it has a different name.

Another common misconception is separating a square from the identified category of rectangles. A square exhibits the same characteristics of rectangles, however it is special rectangle because it sides are equal in length.

Students often mistake a change in size or orientation of a shape as a change in the name of the shape. One of the most common misconceptions in geometry is the belief that orientations are tied to shape. A student may see the second of the figures below as a triangle, but claim to not know the name of the first.
Students need to have many experiences with shapes in different orientations. For example, ask students to form other triangles with the two triangles in different orientations.



TASK DESCRIPTIONS

The following tasks represent the level of depth, rigor, and complexity expected of all Kindergarteners. These tasks or a task of similar depth and rigor should be used to demonstrate evidence of learning. It is important that all elements of a task be addressed throughout the learning process so that students understand what is expected of them.

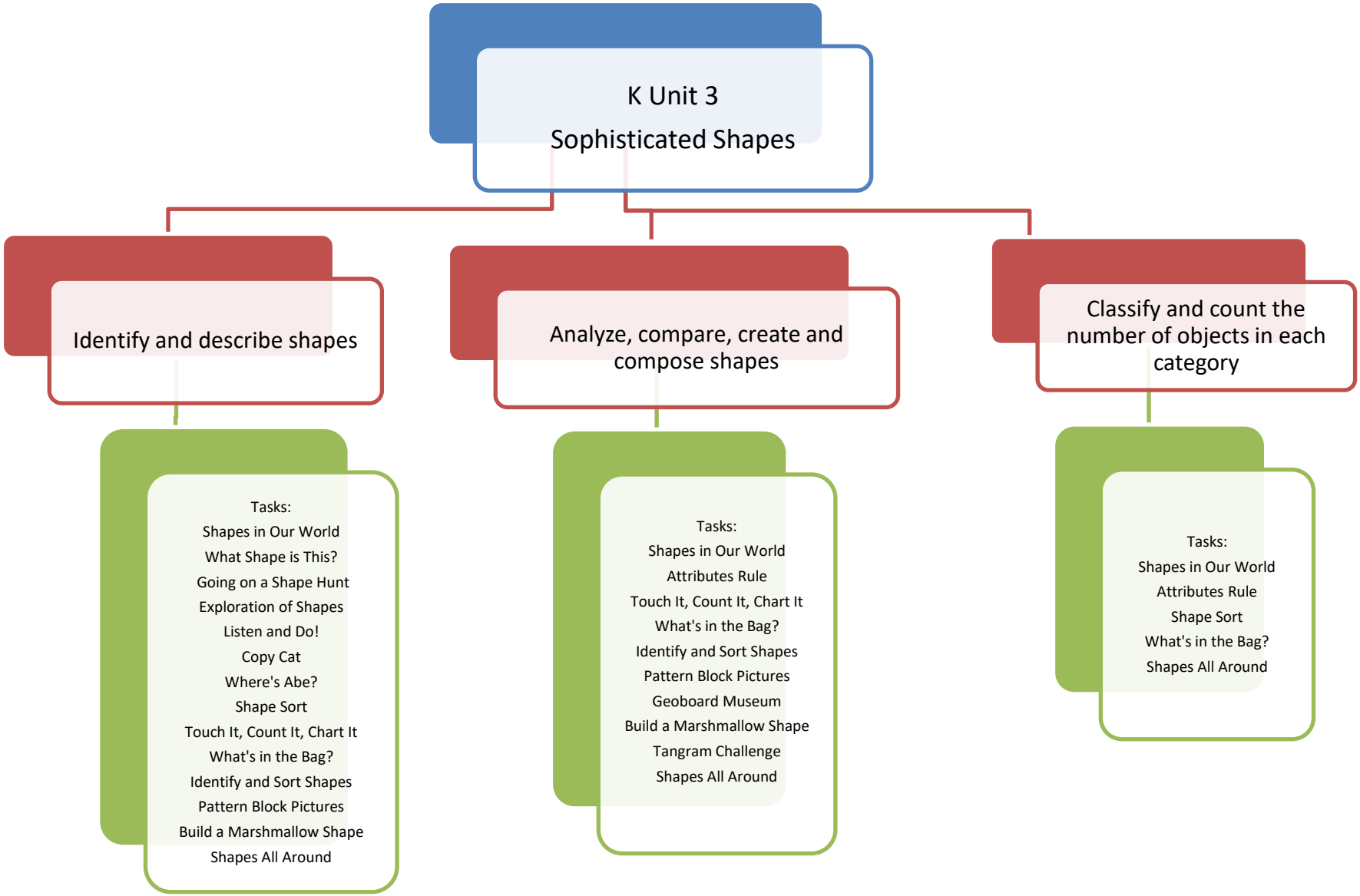
Scaffolding Task	Tasks that build up to the learning task.
Constructing Task	Constructing understanding through deep/rich contextualized problem-solving tasks.
Practice Task	Tasks that provide students opportunities to practice skills and concepts.
Culminating Task	Designed to require students to use several concepts learned during the unit to answer a new or unique situation. Allows students to give evidence of their own understanding toward the mastery of the standard and requires them to extend their chain of mathematical reasoning.
Formative Assessment Lesson (FAL)	Lessons that support teachers in formative assessment which both reveal and develop students' understanding of key mathematical ideas and applications. These lessons enable teachers and students to monitor in more detail their progress towards the targets of the standards.
3-Act Task	A Three-Act Task is a whole-group mathematics task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three. More information along with guidelines for 3-Act Tasks may be found in the ***Guide to Three-Act Tasks*** on georgiastandards.org.

Task Name	Standards	Task Type/ Grouping Strategy	Content Addressed	Description
Shapes in Our World	MGSEK.G.1-6 MGSEKMD.3	3-Act Task *Whole Group*	Recognize, name, analyze, compare, compose, and classify shapes	Students identify shapes found in their environment revealed through a photograph.
What Shape is This?	MGSEK.G.1	Constructing Task *Large group/Small group*	Recognize and name shapes	Students identify and sort different shapes while learning how to identify the different attributes of shapes.
Going on a Shape Hunt	MGSEK.G.1-3	Constructing Task *Large group/Small group*	Recognize and name shapes	Students identify 2-D and 3-D shapes in their environment
Attributes Rule!	MGSEK.G.4 MGSEKMD.3	Constructing Task *Whole Group/Small Group/Individual*	Recognize, name, and compare shapes	Students identify different attributes of shapes
Exploration of Shapes	MGSEK.G.1-3	Practice Task *Large group/Small group*	Observe shapes in the environment (flat/solid)	Students identify and sort shapes into different categories based on their attributes. Students also use positional words to complete the task.
Listen and Do!	MGSEK.G.1-2	Scaffolding Task *Partner*	Spatial relationships Recognize and name shapes	Students listen to different positional words to create a picture using different 2-D shapes.
Copy Cat	MGSEK.G.1	Practice Task *Individual/Small Group*	Spatial relationships Recognize and name shapes	Students create a picture with shapes and then using positional words, the student must describe the position of the shapes to their partner so they create the same picture without seeing the original picture.

Where's Abe?	MGSEK.G.1-2	Practice Task *Partner/Small Group*	Spatial relationships Recognize and name shapes	Students use their knowledge of positional words and identifying shapes to find a penny on a game mat.
Shape Sort	MGSEK.G.1-3 MGSEK.MD.3	Practice Task *Whole Group/ Small* Group/Partner	Recognize, name, and compare shapes	Students use their knowledge of shapes, identifying attributes and sorting to complete a series of activities.
Touch It, Count It, Chart It	MGSEK.G.1-4	Constructing Task *Small Group*	Recognize, name, and compare shapes	Students identify the different faces of a 3-D shape and find the shapes in their environment.
What's in the Bag? (Flat or Solid)	MGSEK.G.2-5 MGSEK.MD.3	Practice Task *Whole Group/ Small Group/ Partner*	Recognize, name, and compare shapes Observe shapes in the environment	Students use their sense of touch to identify different shapes by only their attributes.
Identify and Sort Shapes	MGSEK.G.1-4	FAL	Recognize, name and compare shapes Observe shapes in the environment	This task is used to help assess the student's ability to identify and sort shapes.
Pattern Block Pictures	MGSEK.G.2,3,4,6	Constructing Task *Small Group/ Partner*	Name, compare and compose larger shapes from smaller shapes	Students begin to connect shapes to real life as they create replicas of what they have seen from real world experiences.
Geoboard Museum	MGSEK.G.4-6	Practice Task *Individual/ Small Group*	Compose and compare shapes	Students will use geoboards to show different 2-D shapes and how they can be combined to make a new shape.
Build A Marshmallow Shape	MGSEK.G.3-6	Constructing Task *Large Group/ Small Group*	Recognize, name, compare and compose shapes	Students will build and name flat and solid geometric shapes using toothpicks and marshmallows.

Tangram Challenge	MGSEK.G.5-6	Performance Task *Whole Group/ Individual*	Recognize, name, and compare shapes Compose larger shapes from simple shapes	Students use tangram shapes to build pictures by combining two or more shapes
Shapes All Around	MGSEK.G.1-6 MGSEK.MD.3	Culminating Task *Small Group/ Individual*	Recognize, compose and compare shapes	Students use all concepts to identify 2-D and 3-D shapes in their environment.

Each task is suggested but not required; teachers should choose the most appropriate tasks based on the needs of their students.
For more information on these tasks in this unit please refer to the unit webinar found at
https://www.georgiastandards.org/Archives/Pages/default.aspx



INTERVENTION TABLE

The Intervention Table below provides links to interventions specific to this unit. The interventions support students and teachers in filling foundational gaps revealed as students work through the unit. All listed interventions are from New Zealand's Numeracy Project.

Cluster of Standards	Name of Intervention	Snapshot of summary or Student I can statement. . .
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres). MGSEK.G.1 MGSEK.G.2 MGSEK.G.3	Arty Shapes	Name 2-D shapes and describe shape attributes in their own language
	Shape Explorers	Classify 2D shapes according to how many sides they have
Analyze, compare, create, and compose shapes. MGSEK.G.4 MGSEK.G.5 MGSEK.G.6	Shape Makers	Sort, compare and classify 2D and 3D objects
	New Kids on the Block	Discuss difference and likenesses of the shapes
	Foil Fun	Make, name and describe 2D and 3D objects
Classify objects and count the number of objects in each category. MGSEK.MD.3	I Like Trucks	Sort objects and made a display of the data collected

3-ACT TASK: Shapes In Our World Back To Task Table

Approximately 1 day

In this lesson, students will identify shapes found in their environment revealed through a photograph.

STANDARDS FOR MATHEMATICAL CONTENT

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

MGSEK.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

Analyze, compare, create, and compose shapes.

MGSEK.G.4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.5. Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6. Compose simple shapes to form larger shapes. For example, "Can you join these? two triangles with full sides touching to make a rectangle?"

Classify objects and count the number of objects in each category.

MGSEK.MD.3. Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

STANDARDS FOR MATHEMATICAL PRACTICE

1**. Make sense of problems and persevere in solving them.** Students will make sense of shapes in their world by recognizing, building and creating new shapes.

2. **Reason abstractly and quantitatively.** Students will use numerals to refer to number of sides while observing pictures of shapes and recognize that combining shapes can change the number of sides.

3. **Construct viable arguments and critique the reasoning of others.** Students can clearly express, explain, organize and consolidate their ideas about shapes while composing and decomposing them.

4. **Model with mathematics.** Students will begin to represent shapes in their world by using drawings or objects.

5. **Use appropriate tools strategically.** Students will explore the use of tools (solid shapes, virtual shapes) to explore geometrical solids in the world around them, whenever appropriate.

6. **Attend to precision.** Students will express their ideas and reasoning while using appropriate math vocabulary in regards to the shapes and their attributes.

7. **Look for and make use of structure.** Students will recognize patterns while exploring for shapes such as triangles can be different sizes or colors and still be called a triangle.

8. **Look for and express regularity in repeated reasoning.** Students will begin to notice that as the number of sides increase on a shape, a new shape is created (triangle has 3 sides, a rectangle has 4 sides, a pentagon has 5 sides and hexagon has 6 sides.)

BACKGROUND KNOWLEDGE

This task follows the 3-Act Math Task format originally developed by Dan Meyer. More information on this type of task may be found at http://blog.mrmeyer.com/category/3acts/.

A Three-Act Task is a whole-group mathematics task consisting of 3 distinct parts: an engaging and perplexing Act One, an information and solution seeking Act Two, and a solution discussion and solution revealing Act Three.

More information along with guidelines for 3-Act Tasks may be found in the ***Guide to Three-Act Tasks*** on georgiastandards.org.

Because this is a first experience with 3-Act tasks in Kindergarten, it is imperative that teachers help students in facilitating the conversations that students have when completing these types of tasks. Teachers also must have a conversation with students prior to completing this task on how to ask questions.

COMMON MISCONCEPTIONS

As mentioned in the unit overview, the orientation of a shape can confuse students into thinking that a shape has changed. For example, a rectangle with a vertical orientation may not be identified as a rectangle by some students if it is placed horizontally.

ESSENTIAL QUESTIONS

In order to maintain a student-inquiry-based approach to this task, it may be beneficial to wait until Act 2 to share the EQ's with your students. By doing this, students will be allowed the opportunity to be very creative with their thinking in Act 1. By sharing the EQ's in Act 2, you will be able to narrow the focus of inquiry so that the outcome results in student learning directly related to the content standards aligned with this task.

- How can we describe the location or position of an object or shape?
- How can we describe shapes in our everyday lives?

MATERIALS

- Copy of Act 1 picture for each student or group.
- Math journal for recording information.

GROUPING

Individual/Partner and/or Small Group Task

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION (All SMP's apply!)

In this task, students will view the picture and tell what they noticed. Next, they will be asked to discuss what they wonder about or are curious about. These questions will be recorded on a class chart and/or on the board. Students will then use mathematics to answer their own questions. Students will be given information to solve the problem based on need. When they realize they don't have the information they need, and ask for it, it will be given to them.

Comments

Most Kindergarten students don't yet have the understanding of how to form a question. During Act 2 the students may need the teacher to facilitate the discussion until understanding of a question is achieved.

Anticipated questions students may ask and wish to answer:

- What does the word say?
- What shapes are there?

- How many shapes are there?
- What are the different kinds of shapes?

Task Directions

Act 1 – Whole Group - Pose the conflict and introduce students to the scenario by showing Act 1 picture. **(Dan Meyer** http://blog.mrmeyer.com/2011/the-three-acts-of-a-mathematical-story/**)**

"Introduce the central conflict of your story/task clearly, visually, viscerally, using as few words as possible."

- Show Act 1 picture to students.
- Ask students what they notice in the picture, what they wonder about, and what questions they have about what they see in the picture. Consider doing a think-pair-share so that students have an opportunity to talk with each other before sharing questions with the whole group. Students may need to see the picture several times.
- Share and record students' questions. The teacher may need to guide students so that the questions generated are math-related.
- Ask students to estimate answers to their questions (think-pair-share). Students will dictate their best estimate, then dictate two more estimates – one that is too low and one that is too high so that they establish a range within which the solution should occur. The teacher will then plot their three estimates on a number line.

Act 2 – **Student Exploration: Individual/Partner/Small Group** - Provide additional information as students work toward solutions to their questions. **(Dan Meyer** http://blog.mrmeyer.com/2011/the-three-acts-of-a-mathematical-story/**)**

"The protagonist/student overcomes obstacles, looks for resources, and develops new tools."

- During Act 2, students determine the main question(s) from Act 1 and decide on the facts, tools, and other information needed to answer the question(s). When students decide what they need to solve the problem, they should ask for those facts, tools, and information. It is pivotal to the problem-solving process that students decide what is needed without being given the information up front.

- The teacher provides guidance as needed during this phase. Some groups might need scaffolds to guide them. The teacher should question groups who seem to be moving in

the wrong direction or might not know where to begin. Questioning is an effective scaffolding strategy, using questions such as:

- What is the problem you are trying to solve?
- What do you think affects the situation?
- Can you explain what you've done so far?
- What strategies are you using?
- What assumptions are you making?
- What tools or models might help you?
- Why is that true?
- Does that make sense?
- How do you know?
- Are you sure?

Additional Information for Act 2

Important note: Although students will only investigate the main question(s) for this task, it is important for the teacher not to ignore student-generated questions. Additional questions may be answered after they've found a solution to the main question, or as homework or extra projects.

Act 3 – Whole Group – Share solutions and strategies.

- Students present their solutions and strategies and compare them.
- Reveal the solution in Act 3 video, picture or solution.
- Lead discussion to compare these solutions, asking questions such as:
    - What shapes did you find?
    - How many shapes did you find?
    - Did you find several of the same shape? If so, how many did you find?

FORMATIVE ASSESSMENT QUESTIONS

- Can you show me the difference between a side and a corner?
- Can you tell me the difference between a side and a corner?
- Are all triangles the same?
- Are all four-sided shapes the same?

DIFFERENTIATION

Extension

- Have students identify if any of the shapes could be combined to make bigger or new shapes and record their findings.

Intervention

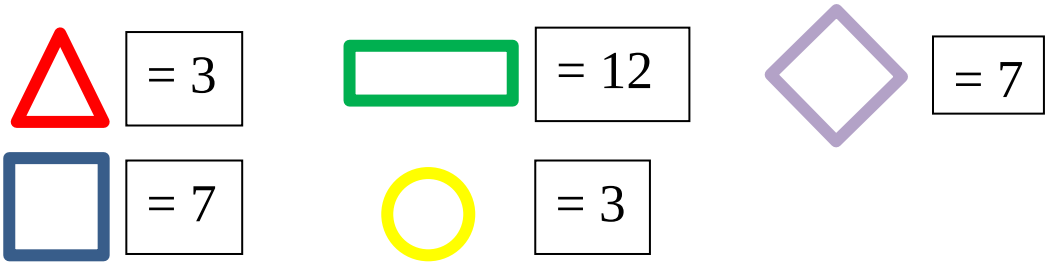
- Have students only identify one shape in the picture and record how many examples of that shape they have found within the picture.

Back To Intervention Table

Act 1: Image credited to Daley Jalboot Architecture

Act 2: Explained above.

Act 3:



Teacher note on observed shapes:

The purple rhombi are also squares. The blue squares are also rhombi. Thus, there are 7 of each.

The two rightmost squares (doorway and right yellow square) together form a single rectangle, as do the two leftmost shapes (doorway and left yellow rectangle). These three shapes taken together also form a long rectangle. These three shapes plus the rectangle above them (the library sign) form another larger rectangle. Thus, there are 12 rectangles.

Students may find only the uncombined shapes, which would change the numbers given in the reveal above.

Students may see other shapes which are not outlined nor mentioned in this explanation. That's wonderful! Encourage them to justify and explain what they see.

CONSTRUCTING TASK: What Shape is This?

Back To Task Table

Approximately 2 days

STANDARDS FOR MATHEMATICAL CONTENT

Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

MGSEK.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Teachers will need to allow for various ways to sort the shapes because this will be a way to build the student's understanding of the properties of shapes. Some students may have sorted only by sizes of big and little, others may have sorted by shapes. Pay special attention to any examples that show groups of shapes and more specifically, the sorting within a specific category of shape. Also notice if any examples have separated the squares/rectangles…remember squares are special rectangles… from the other four-sided shapes. REMEMBER, we refer to all four-sided shapes as quadrilaterals in Kindergarten AND we need to be mindful when talking about squares/rectangles, making sure to emphasis that squares are special kinds of rectangles that have all four sides the same length.

ESSENTIAL QUESTIONS

- How can we describe shapes in our everyday life?
- What makes shapes different from each other?
- How can shapes be sorted?

MATERIALS

- Circles, triangles (equilateral and right triangles), quadrilaterals (squares and rectangles of different sizes and colors), rhombus,
- One set of above mentioned shapes for each child – 4 of each shape
- Word cards labeled square, circle, rectangle, rhombus, and triangle.
- *When a Line Bends…A Shape Begins* by Rhonda Gowler Greene or similar book

GROUPING

Individual and/or Small Group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Gather students together on carpet area. Pose this question, "What do you know about shapes? Let's brainstorm what we know about shapes." As students share their responses, record these on chart paper. (This group time is a chance to record all responses; we are simply gathering information at this point. A small discussion can begin, but you want to focus on gathering information for yourself as well. This is a great way to do an informal pre-assessment of the student's knowledge of shapes. We want to quickly chart this information; we will come back to these responses after parts II and III of this task.) Once you charted their shape ideas, say "Let's read a book to see what we can find out about shapes. This will give us information we can compare to our chart. Listen to see if you hear any of the same ideas we had in our chart or if you hear something new." After reading a book similar to, *When a Line Bends…A Shape Begins*, by Rhonda Gowler Greene, ask students to share the new or different information they heard about shapes compared to what was listed on the chart. Use a different colored marker to add new information or mark out information that we no longer agree with based upon the story. You will need to keep this chart for future conversations with students about shapes. (SMP 1,6)

Part II:
Read a new book about shapes to springboard the second part of the learning task. Other examples of shape books include *Shapes, Shapes, Shapes* by Tana Hoban and *My First Book of Shapes* by Eric Carle. Give students a bag of precut shapes. You will find a student sheet below for this part of the task. Say to the students, "Group your shapes the way you think they should go together. You should be prepared to share your thinking with a partner." Once students have sorted their shapes for a few minutes, have them glue down their sorting. Then have students partner with their elbow buddy and compare their sorting. Encourage students to discuss their sorting methods. Next, pull students together for a class discussion. The class discussion should ensue from this part of the task about the various ways to sort the shapes. (SMP 1,3,6,8)

Part III
Begin this portion of task by reviewing the work completed yesterday. This should be a quick discussion including the charts that were made in Part I of the task. Display the same set of shapes of different sizes from Part II of the task. It is important to use these same shapes, so that students can focus on the various characteristics.

The teacher will model sorting the shapes by size, asking for students to assist in this process of determining where the shape was to be placed on the chart. After sorting the shapes by size, then say "We have sorted by size and now I am wondering what other information we can use to sort the shapes in a different way. I am going to give you a moment for think time to come up with an idea. When you have an idea, give me a thumbs-up sign." Once you have a number of students

giving you the thumbs up sign, have them partner with an elbow buddy and share their idea. Have a partner pair come to the front and share their ideas.

This part of the task will be fueled by their thinking. You may have discussions such as this: "Sam has sorted his shapes by the number of sides. Did anyone else sort their shapes by the number of sides? I see that you sorted them into a group that has shapes with four sides. Those shapes fall into a special group called quadrilaterals. This is a new word for us. Let's practice saying that word together. It is special name for shapes. Who could help me group the quadrilaterals together? Wow, I see that there are different kinds of quadrilaterals. What are the names of these two types of quadrilaterals?" The answer to that is **NOT** rectangles and squares; it is rectangles and non rectangles! This is extremely important because **squares ARE rectangles** and need to be classified correctly as such early on in a child's thinking about shapes. There should be some discussion with students about the group of rectangles and how rectangles themselves can be separated into two groups…ones that are squares and ones that are not squares.

As student discussions continue with the number of sides, prepare three charts for the students. The charts should be labeled triangles, circles, and quadrilaterals. Have students give you information about each of the shapes. Refer students back to the chart that was created at the beginning of the task entitled "What We Know about Shapes." Have students use some of the information from that chart to add more information to our more specific charts. (SMP 1,3,6,8)

Part IV
Students will now practice using these clues to play a game with a partner. Have students spread their set of shapes out on their tables. Ask questions like, "Who can find a shape that is a quadrilateral? What about a shape that has three sides?" After modeling this for students a few times, allow students to play this game with a partner. Encourage students to identify the shapes based on the attributes of the shape by asking questions such as: "Which shape has three sides?" or "Show me the shape that has two long sides and two short sides. Show me an example of rectangles that has all sides the same length? Do we have a special name for this kind of rectangle?" To close this task, discuss the similarities and differences of the shapes. Are all **quadrilaterals** the same? Are all triangles the same? Why or Why not? (SMP 1,3,6,8)

TEACHER REFLECTION QUESTIONS

- Are students able to describe the differences in shapes?
- Can the students sort the shapes by more than one attribute?

FORMATIVE ASSESSMENT QUESTIONS

- Where do you see shapes in everyday life?
- Can you show me the difference between a side and a corner?
- Can you tell me the difference between a side and a corner?

- Are all triangles the same?
- Are all four-sided shapes the same?

DIFFERENTIATION

Extension

- Provide a set of blocks or pattern blocks during math centers for students to explore. Using the blocks/pattern blocks to build designs of their own is a good opportunity for them to become familiar with how the geometric shapes fit together.

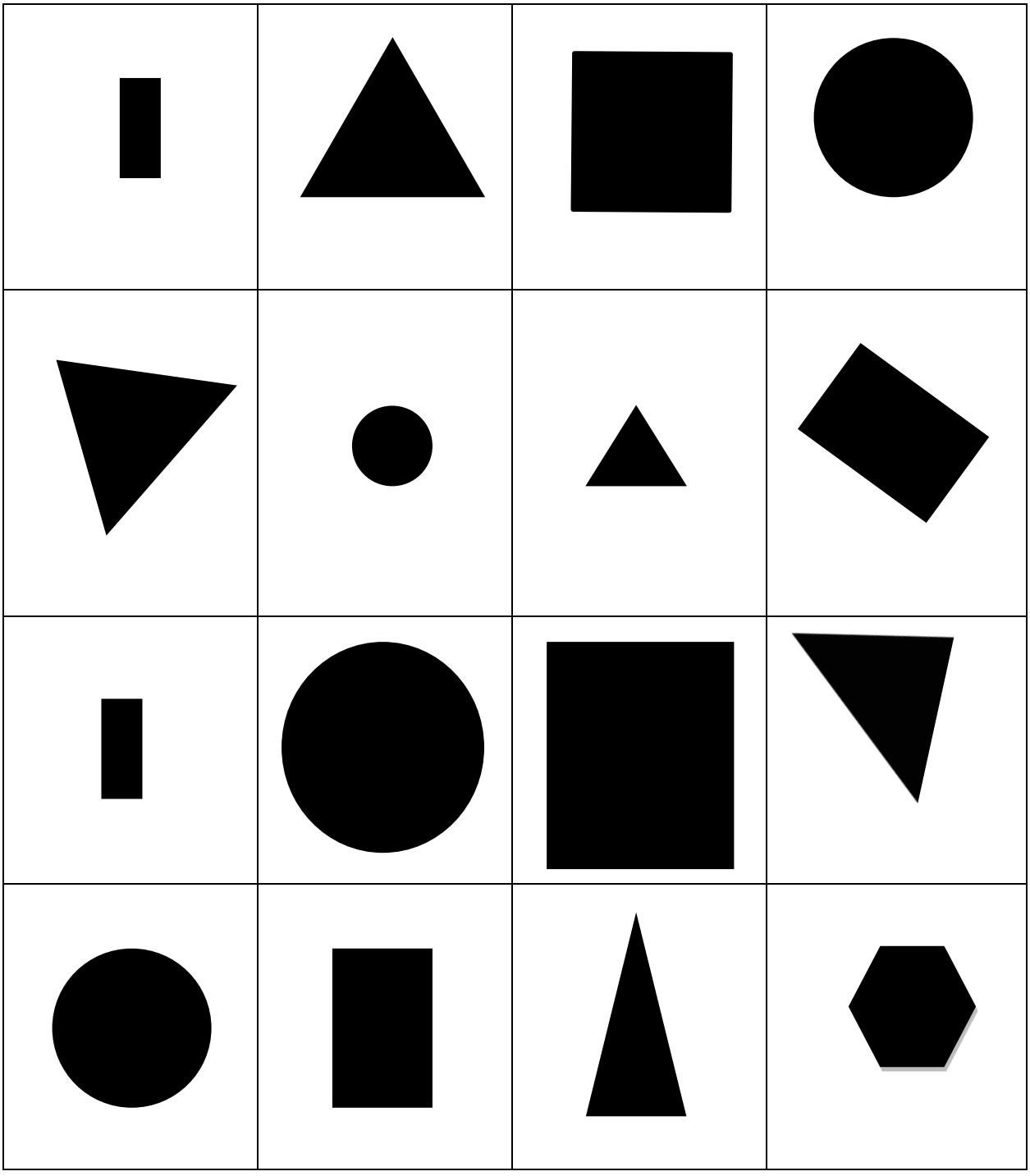
Intervention

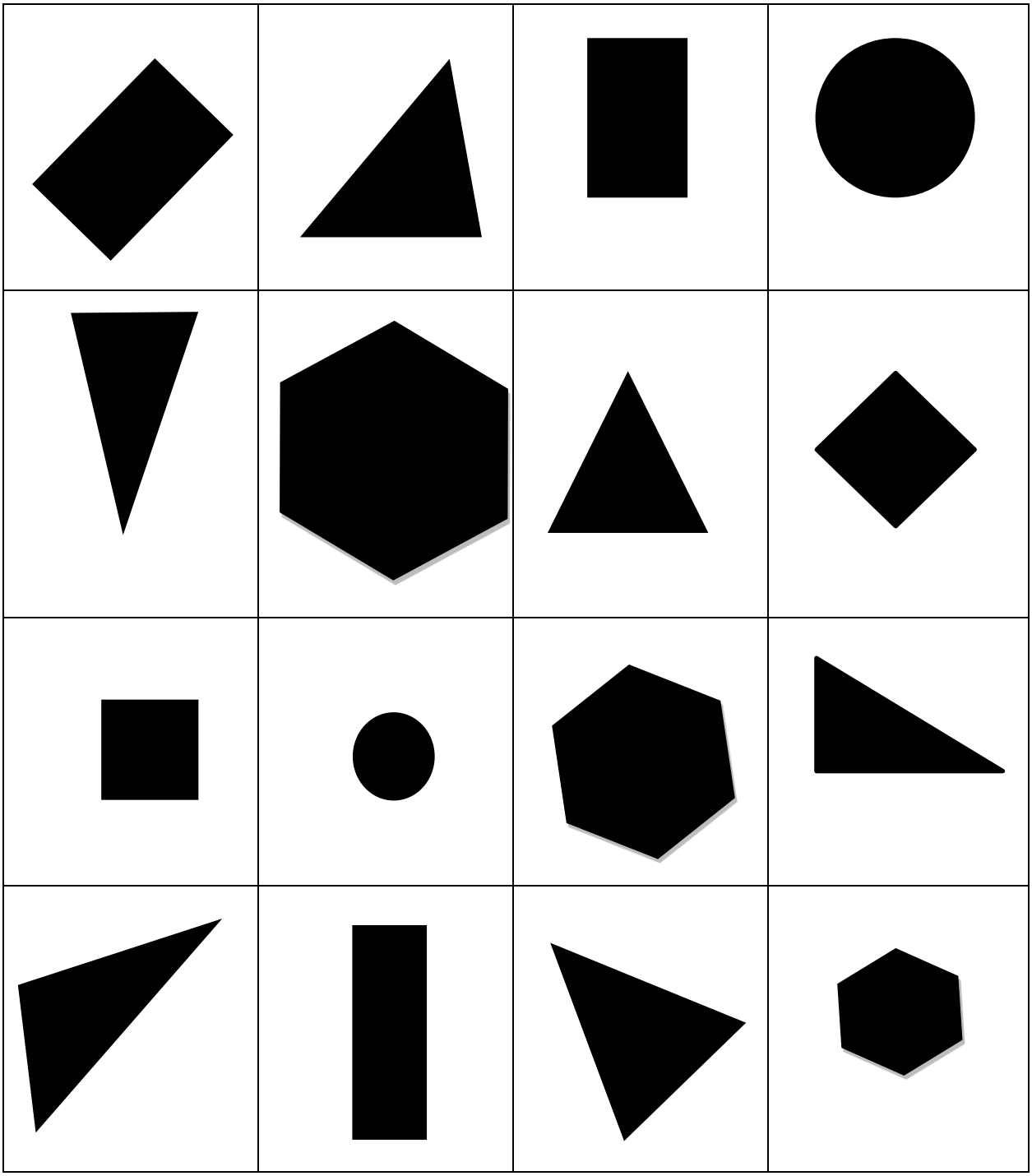
- As the students are exploring, check for understanding by having them name a shape you point to or ask them to hand you a particular shape. Students could also show how they identify a shape by counting the sides and corners.

Back To Intervention Table

TECHNOLOGY

Shapes concentration http://illuminations.nctm.org/ActivityDetail.aspx?ID=73
Students match 2-D figures in a game of concentration





CONSTRUCTING TASK: Going on a Shape Hunt

Back To Task Table

Approximately 2-3 days (Adapted from Read, Write and Think)

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to*.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE:

"Children need experiences with a rich variety of both two- and three-dimensional shapes. It is useful for students to be able to identify common shapes, notice likenesses and differences among shapes, become aware of the properties that different shapes have, and eventually use these properties to further define and understand their geometric world. As students find out more about shapes over time, they can begin to appreciate how definitions of special shapes come to be" (Van de Walle, p193).

ESSENTIAL QUESTIONS:

- How can we describe the location or position of an object or shape?
- How can we describe shapes in our everyday lives?
- What makes shapes different from each other?

MATERIALS:

- *The Greedy Triangle* by Marilyn Burns (Scholastic, 1995)
- *Round Trip* by Ann Jonas (Greenwillow, 1983)
- *Eight Hands Round* by Ann Whitford Paul (HarperCollins, 1991)

- Chart paper or overhead projector
- Cardstock cut to 1" x 6"
- Clipboards or other portable writing surface
- Two- and three-dimensional geometric models

GROUPING

Large group, small group and/or pairs

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Gather students in a large group on the carpet. Introduce or review the names of the geometric shapes that they are learning in order to activate any prior knowledge they may have on shapes. You need to focus solely on two-dimensional shapes and eventually do this activity again solely using three-dimensional shapes.

Read aloud the book that you have selected. The story should be read aloud in its entirety, pausing only to allow students to predict upcoming events. Predicting allows students to focus attention on reasoning, patterns, and problem solving while incorporating what they already know about geometric shapes with the ideas presented in the book. (SMP 1,3,6,7,8,)

Part II
Discuss the idea that shapes are not just in books but are all around us. Introduce the Shape Hunt Chant. As you say the chant, hold up the model of a circle you have prepared for student reference. When you reach the line that says, "Do you see a circle?" ask students to point to a circle in the classroom. Finish the song.

You may wish to have students get up and move to the object they have selected instead of sitting on the carpet pointing. For example, when you say, "Do you see a circle?" pause and allow them to move to a location in the classroom where a circle is located. Once almost everyone is sitting by something, go on with "yes, we see a circle." This is especially beneficial for students who are kinesthetic learners.

Start a list of objects that are circles in the classroom on chart paper. Model various strategies for spelling words. For example, "Maria is pointing at the clock. Can you all point to the word clock in our classroom? Right, it's on a red card beside the clock. You read the letters while I print them on the chart. Jose is pointing at a plate in our house center. I don't see that word anywhere in our classroom. Let's try to write it together. P-p-plate. What letter do I need to print at the beginning of the word plate?" Another strategy is to point out words that are on the classroom word wall or located on posters or in other environmental print.

Repeat the shape hunt chant. You can use the same shape and ask them to choose different objects. Or you can change the shape. If you do this, start a new list on another piece of chart

paper. You may want to limit the number of shapes to four or five, depending on how long each "hunt" takes the students. You might also choose to focus only on two-dimensional or only on three-dimensional shapes.

When you have gone through four or five shapes, you may choose to have students complete either the *Two-Dimensional* Task Sheet or the *Three-Dimensional* Task Sheet task sheet depending on what is most appropriate. Remind them to use classroom labels, the word wall, personal dictionaries, the charts just created, and their ability to sound out words to help them complete their work. (SMP 1,3,6,7,8)

PART III
Review the charts that you created with your students in Session 2.
Inform students that they will be going on a shape hunt outside the classroom. Have them brainstorm some other areas in the school where they could look for shapes such as the office, the library, the gymnasium, the cafeteria, or the hallways.

You may choose to give each student a clipboard or portable writing surface, a pencil, and either the *Two-Dimensional* Task Sheet or the *Three-Dimensional* Task Sheet or both, depending on what they used in Session 2. Review with them how to complete the sheets. Ask students to choose different objects on this shape hunt than they chose during Session 2. Bring along the models of the shapes you used in Session 2.

At each location, choose one shape for students to look for. Show them the model of the shape. If they are completing the task sheets, they should complete the appropriate section. Review with them various strategies they can use to write the words on their sheet-they can sound it out, think about words they know that are similar, or look for environmental print.

When you return to the classroom, allow students a few minutes at their seats to complete their task sheets. Remind them that they may want to check the word wall for words that they were uncertain how to spell correctly. (SMP 1,3,6,7,8)

TEACHER REFLECTION QUESTIONS

- Are students able to find multiple shapes during you hunt?
- Are students able to describe the position of the shapes they find?
- Do students understand the difference between a two-dimensional shape and three-dimensional shape?

FORMATIVE ASSESSMENT

- How many shapes did you find?
- What types of shapes did you find?
- Did you find different kinds of the same shape?
- How can you describe the shapes that you found?

- What shapes were the easiest to find? Hardest?

DIFFERENTIATION

Extensions

- Send home copies of the *Two-Dimensional* Task Sheet or the *Three-Dimensional* Task Sheet and have students go on a shape hunt at home.

- Allow students (with supervision) to use a digital camera to take pictures of all the shapes found in your classroom or your school and create a book of shapes. The book could have a section for each shape and each student could be responsible for writing the text for one page of the book.

- Have students pair up and visit the Sammy's Shapes website where they can identify specific shapes appropriate for their grade level and locate and describe the shapes. This website can be used during math work stations or center time. http://primarygames.com/storybooks/sammy/start.htm

Interventions

- Give the child a picture of a space with shapes highlighted, for example: a picture of a grocery store aisle with the outline of the cereal box bolded. Have them place cut outs or manipulatives on top of the outline.

Back To Intervention Table

TECHNOLOGY

Sammy's Shapes http://primarygames.com/storybooks/sammy/start.htm
This game focuses on identifying specific shapes and locating and describing shapes they find.

Shape Hunt Chant

Adapted from the traditional children's song Going On a Picnic)

Going on a shape hunt,

Leaving right away.

If it doesn't rain,

We'll stay all day.

Adult: Do you see a circle?

Children: Yes, we see a circle.

Going on a shape hunt,

Here we go.

Going on a Flat Shape Hunt

Circle what you found:

square  rectangle  circle 

triangle  hexagon 

Draw the shape:

My shape
was a :_____

Circle what you found:

square  rectangle  circle 

triangle  hexagon 

Draw the shape:

My shape
was a :_____

Circle what you found:

square  rectangle  circle 

triangle  hexagon 

Draw the shape:

My shape was a:

_____

Circle what you found:

square  rectangle  circle 

triangle  hexagon 

Draw the shape:

My shape was a:

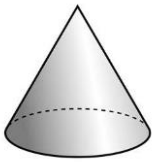
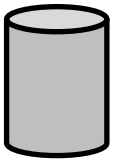
_____

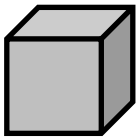
Going on a Solid Shape Hunt

Circle what you found:

sphere cube cylinder cone

Circle the shape you found:

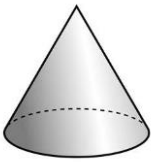
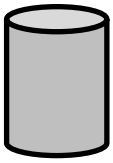


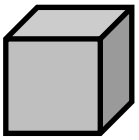
My shape
was a:_____

Circle what you found:

sphere cube cylinder cone

Circle the shape you found:

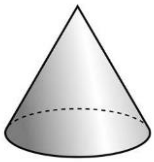
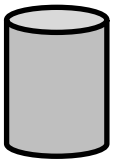


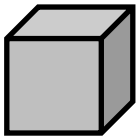
My shape
was a:_____

Circle what you found:

sphere cube cylinder cone

Circle the shape you found:

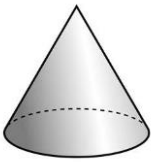
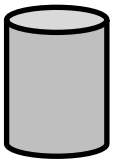


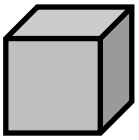
My shape
was a: _____

Circle what you found:

sphere cube cylinder cone

Circle the shape you found:

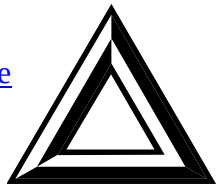





My shape
was a: _____

SCAFFOLDING TASK: ATTRIBUTES RULE!

Approximately 1 day Back To Task Table



STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G. 4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

As Van de Walle states, "In any sorting activity, the students should decide how to sort, not the teacher. This allows the students to do the activity using ideas *they* own and understand. By listening to the kinds of attributes that they use in their sorting, you will be able to tell what properties they know and use and how they think about shapes". (Van de Walle pg. 194)

ESSENTIAL QUESTIONS

- How can we describe the position or location of an object or shape?
- How can we use words that describe location in our everyday lives?
- How are shapes alike and different?

MATERIALS

- Attribute blocks

GROUPING

Whole group, small group and/or partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment: ordinal numbers and patterns are not mentioned explicitly in the standards however they should be integrated into lessons whenever possible.

PART I

Gather students at a central meeting place. Discuss/review what an attribute is and allow students to provide examples. Give each student a handful of attribute blocks and have them sort the blocks and share with classmates how they sorted. Allow for ample time to explore and share (SMP 1,6).

PART II (Attribute Train)

Gather students together to form a circle to play the attribute train game. Begin the attribute train by placing one block in the center of the circle. Next, choose a student to add to your train by putting a block next to the first block. The next block added must have one common attribute with the block previously laid. Have a class discussion about what is the same about the two shapes and what is different. The next student in the circle repeats the steps and ads a third block to the train. (Example: *Student 1* lays an attribute block down and says "A thick, large red circle" *Student 2* lays an attribute block down and says "A skinny, small red square." *Student 2* explains that the circle and the square are both red but different shapes) Next time the train goes around have the student match 2 attributes with the previous block.
(SMP 1,3,4,5,6,7,8).

Comment: During the lesson continue to ask the students questions about their shape and if there are any other attributes that may link their block to the previous one.

PART III (Guess My Sort)

Place students in pairs. One partner picks three blocks with similar attributes and shows their partner. The partner has 2-3 guesses to identify how the blocks were sorted. If the partner correctly identifies the sorting attribute, the roles switch. If not, the players' roles remain the same. The students will be shown four attribute blocks, three of which have some similar properties or characteristics (based upon, shape, size, color, thickness.) Discuss which three belong together and why. Have students justify their reasoning. The teacher can decide how the students share their choices and their reasoning. Provide several examples, and then allow students to work on their own to create their own examples. After partners have worked together and explored the various ways to sort attribute blocks, have them expand to a group of 4 or 5 and play the game *Guess My Sort* with a group of students. Students take turns trying to identify the sorting rule.

After students have shared within small groups, have all the groups meet back at a meeting place and share the different ways they sorted their shapes. Ask students what their favorite way to sort the shapes was and create a bar graph to display the result. The data collected for this graph will usually result with the that students are most familiar with. (SMP 1,3,4,5,6,7,8)

TEACHER REFLECTION QUESTIONS

- Can students sort shapes in multiple ways?
- Are students able to describe the attributes of their shape?
- Can students able to identify common attributes of shapes?

FORMATIVE ASSESSMENT QUESTIONS

- Is there another attribute you could have sorted by?
- How many attributes does the _____have?
- How did the attributes help you sort the shapes?
- What information can we learn from the graph?

DIFFERENTIATION

Extension

- Students can be asked to sort shapes that have more than one matching attribute using the Guess My Attribute game.

  Guess My Attribute
  Students play this game in pairs. Student A places an attribute block on the first circle. Student B will place an attribute block on the next circle by following the number of lines: if there is 1 line, the student places an attribute block with only 1 different attribute, if there are 2 lines, the student will place an attribute bock with 2 different attributes, and 3 lines mean there will be 3 different attributes.
  As students make their placements, they are to share why the attribute block they have chosen the correct block. This should result in much conversation about attributes.

Intervention

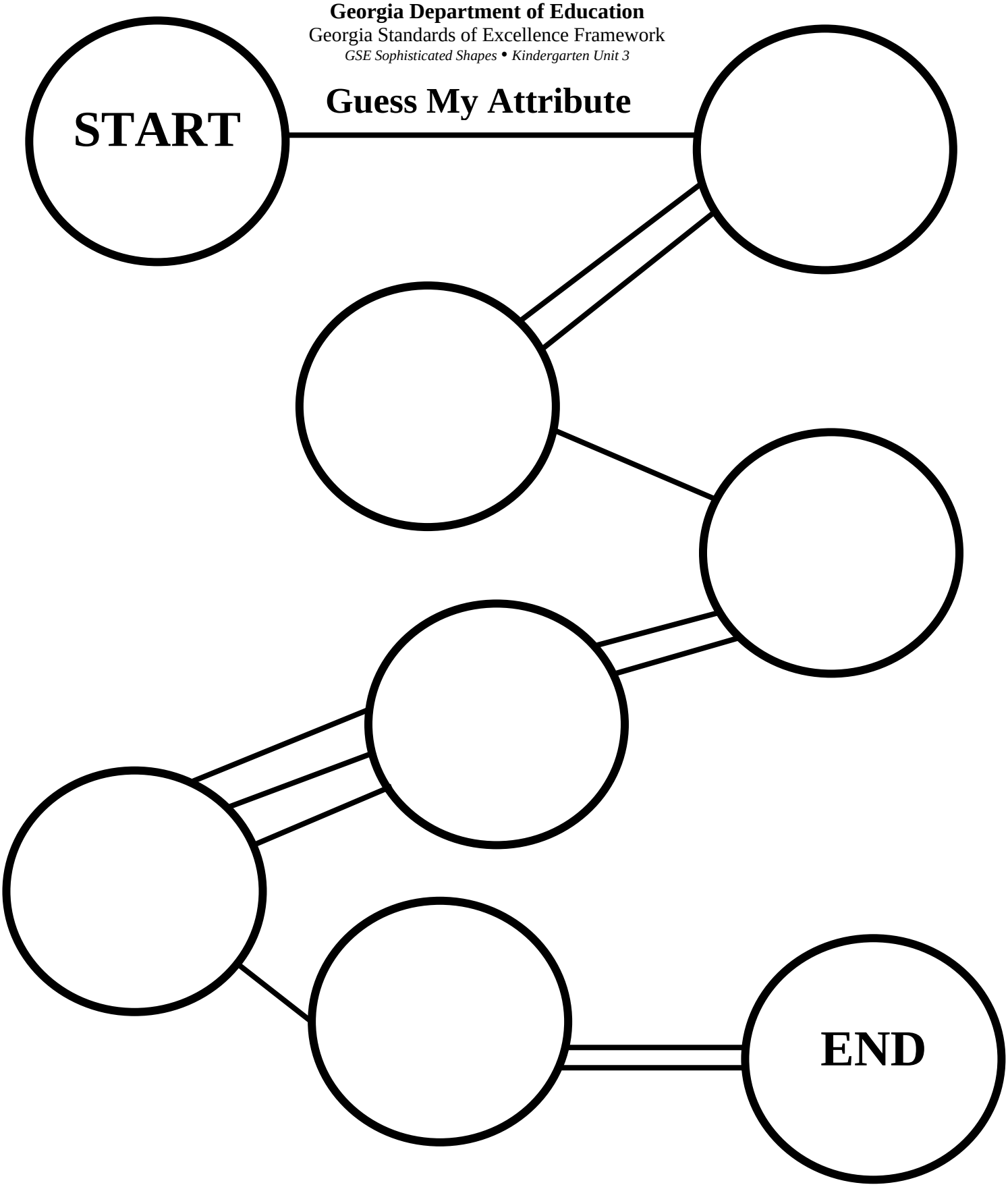
- Have the students identify a list of attributes and have them pick an attribute from the list to help guide their sort.

Back To Intervention Table

TECHNOLOGY

Shapes Concentration http://illuminations.nctm.org/ActivityDetail.aspx?ID=73
Students match 2-D figures in a game of concentration

Guess My Attribute



SCAFFOLDING TASK: Explorations of Shapes

Back To Task Table

Approximately 2-3 days (Adapted from Ohio DOE)

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to*.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

"Children need experiences with a rich variety of both two- and three-dimensional shapes. It is useful for students to be able to identify common shapes, notice likenesses and differences among shapes, become aware of the properties that different shapes have, and eventually use these properties to further define and understand their geometric world. As students find out more about shapes over time, they can begin to appreciate how definitions of special shapes come to be" (Van de Walle, p193).

ESSENTIAL QUESTIONS

- How can we describe the location or position of an object or shape?
- How can we describe shapes in our everyday lives?
- How are quadrilaterals and triangles different?
- How can shapes be sorted?

MATERIALS

- small collection of two-dimensional shapes or attribute blocks

- paper shapes made of different color construction paper (pre-cut)
- chart paper
- Student Needs: manila drawing paper
- Markers
- glue
- different color paper shapes
- collection of stickers

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I

Show students a small collection of two-dimensional shapes. It might be best to start with three rectangles, three triangles and three squares. The figures will need to be of varying sizes and color. Attribute blocks may be used if supplemented with different types of triangles (scalene, right, isosceles, obtuse, and acute).

Begin by asking students to identify each figure. Discuss characteristics of each shape. Record the characteristics on chart paper. Sometimes students may think that all shapes have sides, including circles. In the results from the field test of this task, one student tried to convince his/her teacher that the "sides of a circle could be counted the same way that you count the sides of a triangle or square." Further questioning of the student found that he/she was talking about the inside and outside of the circle. Students at this age often make associations with what they think a word means.

Next, ask students to look at a collection of shapes and sort figures into groups, explaining how the shapes in each group are alike. Possibilities include all the same shape, all the same size (different triangles, different rectangles, as well as different orientations), and all the same color. Ask students to discuss and explain differences among shapes and create collections of shapes that are all different in one way (size, color, or shape).

Ask students to look around the classroom to identify objects that have the same shape as a rectangle, square, circle, oval, triangle, etc. Stress that the **surface** of the desk is a rectangle, the **surface** of the door is a rectangle; the **surface** of the clock is a circle, etc. Misconceptions continue into adulthood that a ball is a circle and a block is a rectangle.

Show students several examples of the same shapes, such as different types of triangles (scalene, right, equilateral, isosceles, obtuse, and acute) in different orientations. Often, shapes are repeatedly presented to students in the same way. Students need to have experience looking and manipulating the same shape in different orientations. (SMP 1,3,5,6,7,8)

PART II

Provide the students with the work mats from the *Identify and Sort Shapes FALs*, an assortment of stickers and the shapes discussed in class made of different colors of construction paper. Pre-cut the shapes before distributing them to the students.

Instruct the students to sort the shapes. Do not tell them how to sort the shapes.

Facilitate a discussion about the way the students sorted their shapes (color, size, shape).

Instruct the students to put squares above the line on the work mat and the triangles below the line on the same work mat. Give them time to glue the shapes on the paper. Observe where the students are placing the shapes.

Instruct the students to place a star above one of the triangles. Students sometimes confuse "above" and "below" with "up" and "down." If some students are challenged by these words, select other students to demonstrate the placement of the stickers and give an explanation. For example, some students may hold the sticker over the paper for above or under the table for below. Modeling the placement may help the students.

Ask the students where they placed the star. Give other directions for placing stickers on this mat, based on the type of stickers you have available. Ask the students about the placement. Repeat the activity with another work mat. One teacher used the following directions for the placement of the stickers.

- Put the frog above the circle.
- Put the apple below the circle.
- Put the fish on top of the circle.
- Put the smiley face beside the circle.
- Put the dinosaur inside the circle.
- Put the star outside the circle.
- Put the shark under the circle.

Observing the placement of the stickers should be done as the students are working. Questions should be asked pertaining to the placement of the stickers such as "Does 'under' the circle mean the same as 'below' the circle?" For example, some students may pick up the paper and place the sticker on the desk or place the sticker at the bottom of the paper. (SMP 1,3,4,5,6,7,8)

TEACHER REFLECTION QUESTIONS

- Are students able to use mathematical language to describe the position of a shape?
- Are student able to tell how shapes are alike or different from another shape?
- Do students understand the importance of using positional words correctly?

FORMATIVE ASSESSMENT QUESTIONS

- Where do you see shapes in everyday life?
- Can you show me the difference between a side and a corner?
- Can you tell me the difference between a side and a corner?
- Are all triangles the same?

- Are all four-sided shapes the same?
- What position is your shape in?

DIFFERENTIATION

Extension

- Have a scavenger hunt for shapes that can be found in the classroom, school and community environment.
- Ask students to bring in objects or pictures for a featured "shape of the day or week."
- Ask parents to help their children identify shapes in their environment and label them. You could modify this activity for use with 3D Shapes.

Intervention

- Some children may have difficulty distinguishing shapes. Model how to trace the perimeter of shapes and encourage the children before they try to identify or describe the shape. Have the students trace the objects in shaving cream, salt, sugar, on sandpaper, or in pudding.
- Introduce two shapes at a time as follows: This is a _____ and this is a _____; show me a _____ and show me a _____; tell me what this is _____ and what this is _____

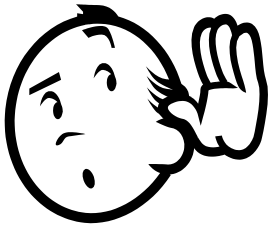
Back To Intervention Table

TECHNOLOGY

Patch Tool http://illuminations.nctm.org/ActivityDetail.aspx?ID=27
Students use pattern blocks to create pictures or combine shapes to make new shapes.

PRACTICE TASK: Listen and Do!

Back To Task Table



Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

In Kindergarten children learn about everyday positional descriptions-*above, below, beside, in front of, behind,* and *next to*. These are the beginnings of the standards' goal of specifying location.

ESSENTIAL QUESTION

- How can we describe the location or position of a shape or an object?

MATERIALS

- Drawing paper
- Crayons or markers

GROUPING

Individual and/or small group

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Students will listen to the directions and draw objects or shapes according to where something is to be placed. They will listen to entire directions the first time without drawing. While listening to the directions a second time, the students will draw.

- Draw a house on your paper. (square and triangle)
- Draw a door on your house
- Draw a dog **in front** of your house.
- Draw a tree **next to** the house.
- Draw a window **above** the door.
- Draw another window **next to** the first window. (Might need help with ordinal)
- Draw a girl **behind** the tree.
- Draw a sun **next to** the house.
- Draw a boy **below** the sun.
- Now color your picture.

Give time for students to draw, closely monitoring to see when you need to move to the next direction. Have students pair/share after the activity. As students share their work with a partner, they should be using positional words to describe the picture they drew. (SMP 1,3,4,6)

TEACHER REFLECTION QUESTIONS

- Which directional words are students having the most difficulty with?
- Can students follow a list of directions accurately?
- Are students able to explain how direction words help us find an object or place?

FORMATIVE ASSESSMENT QUESTIONS

- How is your picture the same or different from your neighbor's?
- Which directions would look similar? How do you know?
- Which direction was the hardest for you to follow? What made it so hard?
- Which direction was the easiest to follow? Why?

DIFFERENTIATION

Extension

- While on the playground, students could set up their own "Listen and Do" activity. One person would be the leader and give others directions such as; going over three objects, around one object, and under two objects, etc.

- Provide partners with pattern blocks and a folder. One student will call out directions as he or she creates a pattern block train on one side of the folder. The other student will listen and create a pattern block train on the other side of the folder. Once directions are finished, the folder is removed, and students check to see if pattern block trains match.

Intervention

- Provide students with left/right reminder cards if needed. Some students may need fewer directions to begin the task and then can progress to more as they master four or five directions. Below is an example of how to structure such an activity:

- Divide a sheet of paper into fourths and then give directions specific to one box at a time. For example: "In the **top left** box, write your name. In the **top right** box draw a circle with a triangle **inside** of it. In the **bottom left** box, write the numeral three and draw three flowers. In the **bottom right** box, draw a puppy close to a boy." Have students describe what they did using positional words.

Back To Intervention Table

TECHNOLOGY

Turtle Diary Compose Shapes Geometry Game https://www.turtlediary.com/game/compose-shapes-using-one-square-three-triangles.html
Students are using an outline of a shape and use basic shapes like squares and triangles to build this shape.

SCAFFOLDING TASK: Copycat

Back To Task Table

Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

BACKGROUND KNOWLEDGE

Children come to kindergarten with diverse backgrounds, experiences, and abilities. A one-size-fits-all approach to instruction will most likely slow the progress of some children and be overwhelming to others. Differentiated instruction is an effective way to offer individually, linguistically, and culturally appropriate curriculum that helps all children meet the GSE.

In kindergarten children learn about everyday positional descriptions-*above, below, beside, in front of, behind,* and *next to*. These are the beginnings of the standards' goal of specifying location.

ESSENTIAL QUESTIONS

- How can we describe the location or position of a shape or an object?

MATERIALS

- Different 2-D (Plane) Shapes
- Folders or something to obstruct view of partner's creation
- *Pattern* by Henry Arthur Pluckrose and *Shape* by Henry Arthur Pluckrose

GROUPING

Partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Gather students on the carpet for a game of copycat. Read a story such as *Pattern* by Henry Arthur Pluckrose and *Shape* by Henry Arthur Pluckrose. Discuss the patterns and shapes shared in the story. Next, model for students how to create a pattern using the shape manipulatives and manila folder to hide the pattern on the other side of the folder. It is important to model for the students how to complete this task. You may want to model for the students sitting in a way that the students can see the pattern that has been created, as well as the work of the student who is creating the "copycat" version. The modeling of this process is very important to the overall understanding of giving explicit, concise directions for the spatial relationships. Have a child build a design using different colors (shapes) and allow the child to describe to the teacher using directions to recreate the design using spatial or positional words. Say to students "Tell how your partner could make a design exactly like yours without your partner seeing your design. Only use words to help. Be sure not to point, signal, or touch anything to give additional clues." The partner may only put a block in their structure when verbal directions are given.

For example, the child might say, "Put a yellow circle beside the red circle. Then put a blue square above the yellow square." Reverse roles and play again. Once a few children have learned how to do this, allow them to teach the game to others. "Beside" can be either left or right, or, if students can differentiate between the two, they may specify to the left or right. When your partner has finished, let him/her see your design and check that the two designs are exactly the same.

TEACHER REFLECTION QUESTIONS

- Are students able to use mathematical language to describe the position of a shape?
- Are students able to tell how shapes are alike or different from another shape?
- Do students understand the importance of using positional words correctly?
- Are students able to explain how direction words help us find an object or place?

FORMATIVE ASSESSMENT QUESTIONS

- What is a positional word?
- What does location mean?
- Can you describe (on top of, underneath, beside, next to, in front of, etc…)

DIFFERENTIATION

Extension

- Once several children have become adept at this, teach them to play back to back. One builds, and then describes the design to the other child who attempts to build it without looking. When they agree that the design is complete, they may turn and look to see if the designs match.

Intervention

- The student gives directions to the teacher while the teacher builds and the student observes. Then the role is changed and the student builds while the teacher gives directions.
- If students have a difficult time with this task, practice by playing "Simon Says" emphasizing the words above, beside, below, behind, inside, and outside. The familiarity of this game may provide a link for some students.

Back To Intervention Table

TECHNOLOGY

Turtle Diary Compose Shapes Geometry Game https://www.turtlediary.com/game/compose-shapes-using-one-square-three-triangles.html
Students are using an outline of a shape and use basic shapes like squares and triangles to build this shape.

PRACTICE TASK: Where's Abe?

Back To Task Table

Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.

BACKGROUND KNOWLEDGE

In kindergarten children learn about everyday positional descriptions- *above, below, beside, in front of, behind,* and *next to*. These are the beginnings of the standards' goal of specifying location. These informal indicators of location are used for everyday interaction. (Van de Walle, pg. 213)

ESSENTIAL QUESTIONS

- How can we describe the location or position of a shape or an object?
- How can we describe the position of a shape?

MATERIALS

- 1 penny and 25 counters
- 2 *Where's Abe?* playing boards

GROUPING

Small group and/or partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Each player is given a board. Player 1 has the penny and places it in any square on the board and does not identify the square to player 2. Player 1 must ensure that his board remains covered

and/or out of sight from player 2. An open folder works well as a screen between the two boards. (This is similar to the game *Battleship*)

Player 2 begins to ask questions to player 1 trying to find out where player 1 has hidden Abe on the mat. (example: is Abe located above the square, is Abe located on top of the square, etc…). With each question, player 1 can only respond with "Yes" or "No". This forces player 2 to be more specific in their questioning.

The only question that player 2 CANNOT ask is if Abe is in the same row/column as a shape. For example, the student may not ask, "Is Abe in the triangle row?" As players get comfortable with the game, have them eliminate all the squares where Abe could NOT BE hiding by covering them with counters. This will give a greater insight as to which students are beginning to understand locational and positional words. Once player 2 finds Abe the roles in the game are switched.

Before students begin to play you should model the game as both the hider and finder of Abe. (SP 1,3,4,6)

TEACHER REFLECTION QUESTIONS

- Are students able to use mathematical language to describe the position of a shape?
- Do students understand the importance of using positional words correctly?
- Are students able to explain how direction words help us find an object or place?

FORMATIVE ASSESSMENT QUESTIONS

- Where is Abe NOT hiding?
- What positional words will help you find Abe?
- What is your strategy to finding Abe?

DIFFERENTIATION

Extension

- Limit the number of questions player 2 can ask to make their questioning more strategic. (Example: if player 2 can't locate the penny in 5 questions, player 1 hides the penny on the board again.

Intervention

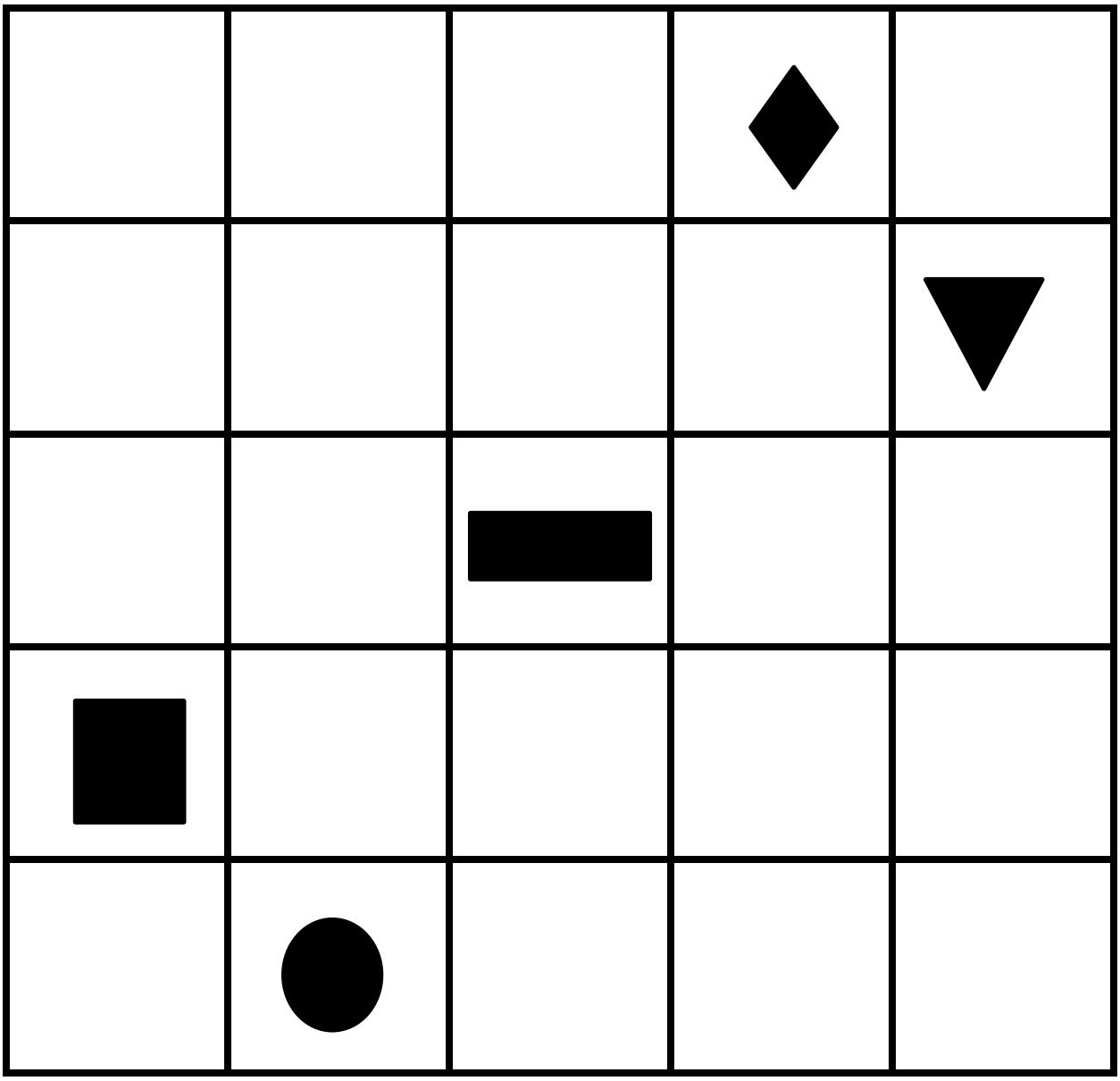
- Downsize the board to a 4x4 grid as opposed to a 5x5. This would limit the possibilities of where player 1 could place the penny on the board. Spell and draw a picture of positional and locational words on index cards for students to refer to as they question.

Back To Intervention Table

Where's Abe?

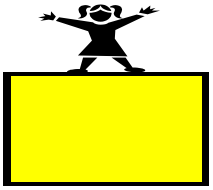
Helper Words

above	below	beside
in front of	behind	next to



PRACTICE TASK: Shape Sort

Back To Task Table



Approximately 2-3 days (adapted from Van de Walle 7.1 & 7.2)

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

MGSEK.G.2 Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

MGSEK.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

Many students in kindergarten struggle to think of a triangle other than an equilateral triangle. This task provides students with an opportunity to explore and sort different shape triangle. Identifying the triangles by their geometric name (scalene, isosceles, and right) is not the focus but the attributes that make them different.

ESSENTIAL QUESTIONS

- How can shapes be sorted?
- What is an attribute?
- What makes shapes different from each other?

MATERIALS

- *Shape Sort* game board
- 5 counters per student

GROUPING

Whole group, small group and/or partners

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment: the following series of tasks could be taught in sequence and over several days.

Like and Unlike Attributes (2 players)
Before giving students the directions, the teacher should place 2 counters on two different shapes on the game board.

Each player is given 5 counters. On the first turn, have each partner place a counter on a different shape. Players take turns identifying the common attributes between the two shapes. Players alternate identifying attributes until one player is unable to identify a common attribute. (Example: If player 1 is unable to identify a common attribute, player 2 gets both counters). The counters are removed from the board and the steps are repeated until all ten counters have been played. The player that collects the most counters at the end of the game wins. (SMP 1,3,4,6,7)

Making a Shape Family (3-4 players)
Have one student in the group pick a target shape and cover it with a counter. The first shape covered is the family shape. One single attribute must be identified, and that attribute becomes the Grandfather Shape and has the "Family Name" (or target attribute). Each student in the group takes a turn covering a shape that belongs in the target shape family according to the common attribute. Every shape that becomes part of the family must have the same attribute (Example: each shape in the target family has only 3 corners). After no more shapes can be added to the family, have students identify another attribute from the grandfather shape. Players take turns removing counters from the shapes that do not have the second attribute that matches the grandfather shape. (SMP 1,3,4,6,7)

Draw My Rule: (small group/whole group)
Students could draw a shape that would fit the rule made for "Shape Family" or teacher could give students a rule and have them draw a shape that matches the rule. (Example: the rule for my shape is that is has 3 straight lines and none of them are the same size. (SMP 1,3,4,6,7)

What's My Rule? (3-4 players)
One player covers 3 shapes on the board that fit a secret attribute/rule. Once the shapes are covered, the other members of the group take turns trying to identify the secret rule. The player that identifies the secret shape becomes the player that covers the shapes and determines the secret rule for the other players to identify. (SMP 1,3,4,6,7)

TEACHER REFLECTION QUESTIONS

- Are students able to tell how shapes are alike or different from another shape?
- Do students understand the importance of using positional words correctly?

- Can students describe how shapes are sorted?

FORMATIVE ASSESSMENT QUESTIONS

- What was the rule you used to sort?
- Could you have sorted the shapes another way?
- What is an attribute?

DIFFERENTIATION

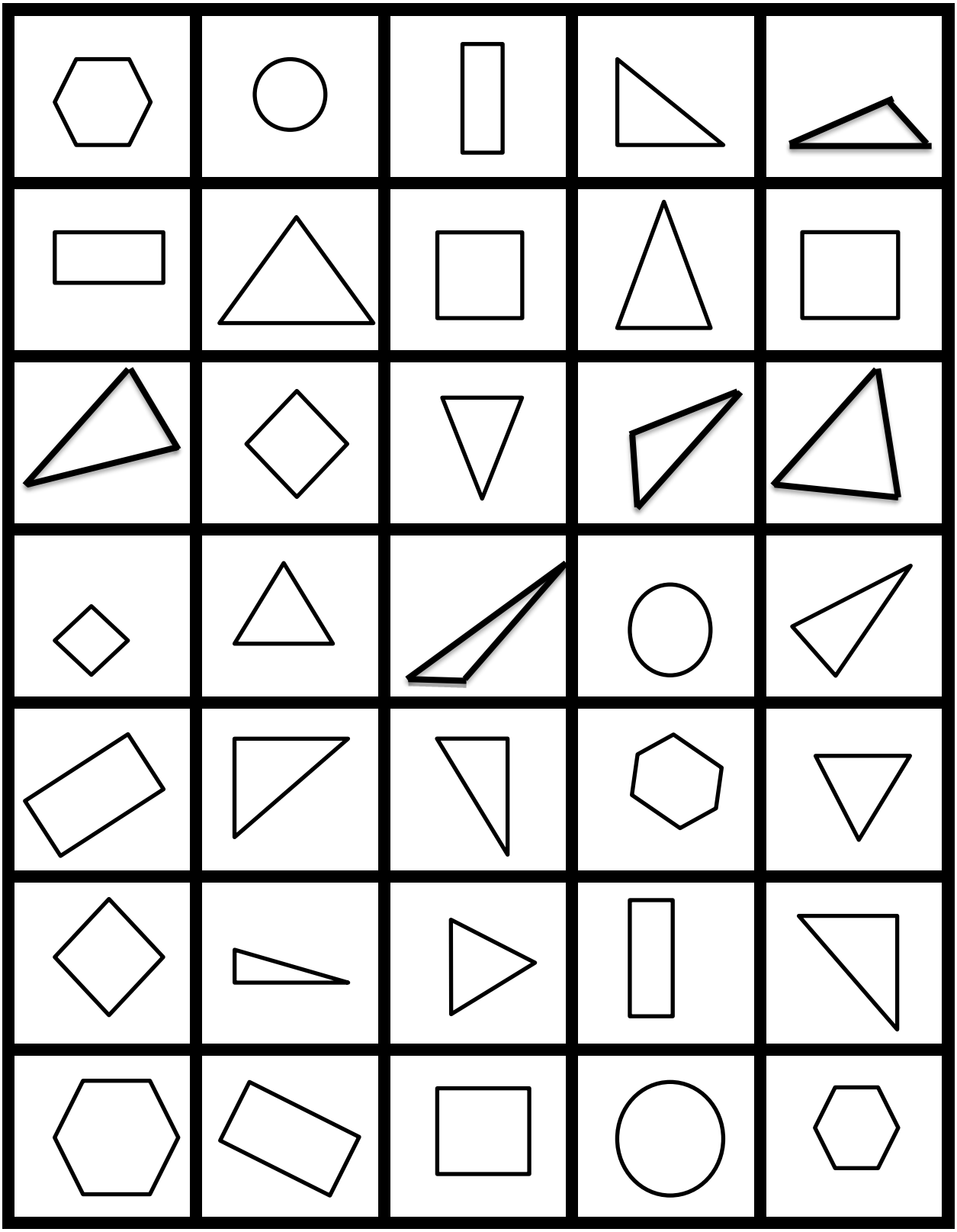
Extension

- Students can be asked to sort shapes that have more than one matching attribute.
- Have them sort just the quadrilaterals or triangle.

Intervention

- Find shapes that have similar sorting attributes.
- Have the students identify a list of attributes and have them pick an attribute from the list to help guide.

Back To Intervention Table



CONSTRUCTING TASK: Touch It, Count It, Chart It

Approximately 1 day

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

MGSEK.G.2. Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("Solid").

MGSEK.G.4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.

BACKGROUND KNOWLEDGE

There are both 3-D (solid) and 2-D shapes (flat) shapes. Students should have a beginning understanding of the difference in sides and faces.

One way to explain how 3-D shapes are different from 2-D shapes is through discussion. "3-D shapes have a solid body. This is why it is easy hold them in our hand. 2-D shapes are flat, which is why it is easy to draw them on paper." If you use the term "solid" when talking about 3-D shapes, then discussing "face" on the 3-D shape is a little easier.

It is natural for students to initially talk about the faces as "sides" but as **you** talk about them use the word face, **not** side. Gradually the students will pick up on this and will start calling the "sides" faces.

ESSENTIAL QUESTIONS

- Where can we find shapes in the real world?

- How can a shape be described?
- How can shapes be sorted?

MATERIALS

- Geometric solid models for: cylinder, cone, cube, and sphere
- Graphic organizer chart
- Student copy of graphic organizer
- Names of geometric solids on index cards
- Index cards (for student labeling)
- Modeling clay or play dough
- Captain Invincible and the Space Shapes by Stuart J. Murphy, or similar text

GROUPING

Small Group

TASK DECRIPTION, DEVELOPMENT AND DISCUSSION

Prepare a chart/graphic organizer to record the characteristics of the three-dimensional figures as you read the story *Captain Invincible and the Space Shapes*.

Part I
Read *Captain Invincible and the Space Shapes* by Stuart J. Murphy, or another book about 3D shapes. Pass solids (cylinder, cone, sphere, and cube) around and ask students to describe how each one looks and feels. Record these characteristics in the graphic organizer. Students will complete the *Touch It, Count It, Chart It* Task Sheet. Allow students to use solids to trace around with a pencil to determine the shape of its face. (SMP 1,5,6)

Part II
Give each student 2-3 index cards. Have students go on a geometric solid shape hunt in the classroom to fill in the last column of the *Touch It, Count it, Chart It,* chart. Students tell the name of the solid it represents, write its name on an index card, and attach it to the item. Shapes can then be displayed in a "Solid Shapes Museum."
As you circulate, observe the student's choices and listen to their conversations. Help students to understand they can learn to recognize the shapes even though they are not exactly the same as the model. During their shape hunt, and as students share their 3-D findings, ask the students questions such as:

- Is this object exactly like our model? How is it the same? How is it different?
- Which solid is the hardest to find in the classroom? Why?
- What do you notice about the faces of the objects? (SMP 1,3,5,6,7)

TEACHER REFLECTION QUESTIONS

- Are students able to talk about where we find shapes in the real world?
- How are the students describing the shapes they are finding?
- Are they able to identify something easily from the classroom without referring back to the solid example?
- Do most students choose the solid they are most familiar with, such as a rectangular prism? Which ones are they not choosing?

FORMATIVE ASSESSMENT QUESTIONS

- How would you describe a solid shape?
- What solid shapes do you see in the classroom? Playground? Home?

DIFFERENTIATION

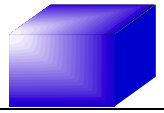
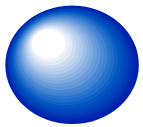
Extension

- Students could determine attributes and then use that information to graph objects from the "Shape Museum". Students could extend their search to the rest of the school and /or use cameras to take pictures of other items that represent 3-D solids. A home connection could be made by sending a parent letter asking students to search for solids they could bring back to school to add to the "Shape Museum."
- Have students use modeling clay or play dough to create some of the solids they identified as they search the classroom. Students can use a model shape to replicate, or compose the shape from memory.

Intervention

- Give struggling students cards with examples of 3-D solids that can be used when they are looking for objects for the "Shape Museum."

Back To Intervention Table

	Numbers of Corners (Vertices)	Numbers of Faces	Draw one face of the solid shape	Everyday object
Cylinder 				
Cone 				
Cube 				
Sphere 				

Touch It, Count It, Chart It

PRACTICE TASK: What's in the Bag? (Flat or Solid)

Approximately 2 days

Back To Task Table

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.2 Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

MGSEK.G. 4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G. 5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Students need to see many examples of shapes that correspond to the same geometrical concept as well as a variety of shapes that are non-examples of the concept. For example, teachers must ensure that students see collections of triangles in different positions and with different sizes of angles and shapes that have a resemblance to triangles but are not triangles. Through class discussions of such examples and non-examples, geometric concepts are developed and refined (NCTM Principles & Standards 2012).

ESSENTIAL QUESTIONS

- What are some attributes of a flat shape? Solid shape?

MATERIALS

- Assorted shapes (2-dimensional and/or 3-Dimensional)
- Paper bags (same amount as shapes)

GROUPING

Whole group, small group and/or partner

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment:
The first time this task is introduced use only 2-D shapes. The second time the activity is used introduce 3-D shapes as well as 2-D. Be sure to include multiples of the same shapes but with different sizes and texture. Label 7 paper bags (A-G). Place (1) shape in each of the 7 bags and prepare 1 extra bag to model how to complete the task.

Gather students to a meeting area and review what an attribute is and the attributes of specific shapes. After reviewing, pass the model bag around and give each student an opportunity to feel inside the bag and identify the shape without looking. STUDENTS MUST WAIT TO SHARE THEIR PREDICTION UNTIL ALL STUDENTS HAVE HAD A TURN WITH THE MODEL BAG. After the bag used for the demonstration has been shared with all the students, have them predict what type of shape is inside the bag and justify why they think it is a specific shape. (Example: I think the shape in the bag is a square because I felt four corners). After all the students have made a prediction, remove the shape from inside the bag and review the attributes of the shape.

Divide the students equally into 7 groups. Each group of students starts at a different bag. Without looking, students feel the shape in the bag while trying to identify the shape's attributes. Once the students think they know what shape is inside the bag they record the attributes they felt and make a prediction by writing the name of the shape or drawing a picture of the shape. STUDENTS SHOULD NOT LOOK IN THE BAG. Once all the students have circulated through the 7 stations have them meet back at the carpet to share what they found and their predictions.

Although this is early in the year students can also be introduced to data and measurement. Example: If the square was in the bag, some students may say there are 3, 4, or 5 sides. Have students count and graph how many students predicted the same number. (SMP 1,3,5,6,8)

TEACHER REFLECTION QUESTIONS

- Are students able to describe the differences between a 2-D and a 3-D shape?
- Are students able to sort and organize the different shapes?

FORMATIVE ASSESSMENT QUESTIONS

- What is the difference between a side and a face? Explain?
- How can you keep track of the attributes of a shape when you can't see it?
- How many sides does the shape in the bag have?

DIFFERENTIATION

Extension

- Place multiple shapes in the bag and have the student match attributes by touch.

Intervention

- Place multiple shapes next to the bag at each station so that as the students feel attributes inside the bag they can try to visually match the shape to what they are seeing.

Back To Intervention Table

What's in the Bag?

Bag	Sides or Faces	Vertices/Corners	Draw a picture or Write the name
A			
B			
C			
D			
E			
F			
G			

Formative Assessment Lesson

Back To Task Table

(adapted from the Kentucky Department of Ed.)

Identify and Sort Shapes **Kindergarten**

This Formative Assessment Lesson is designed to be part of an instructional unit. This task should be implemented approximately two-thirds of the way through the instructional unit. The results of this task should then be used to inform the instruction that will take place for the remainder of the unit.

Mathematical goals
This lesson unit is intended to help you assess how well students are able to sort and identify shapes, both solid and flat, and defend their reasons. It will help you to identify students who have the following difficulties: Not being able to recognize different shapes

- Not being able to count sides of shapes
- Not being able to recognize the difference between solid and flat shapes
- Grouping shapes for matching attributes

Related Standards
This lesson involves mathematical content in the standards from across the grade, with emphasis on:

Sophisticated Shapes K.CC

- Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)
- Analyze, compare, create, and compose shapes.

This lesson involves a range of Standards for Mathematical Practice, with emphasis on:
1. Make sense of problems and persevere in solving them.
3. Construct viable arguments and critique the reasoning of others.
5. Use appropriate tools strategically.
6. Attend to precision.

Materials required
Each individual student will need:

- Various pattern blocks, solid shapes, real life shapes

Each small group of students will need the following resources:

- One copy of each sorting mat (#1-5) of teacher's choice (ex: you will choose between flat/solid/3 sides/4 sides/ no sides)
- Various pattern blocks, solid shapes, real life shapes

Time needed
Approximately 15 minutes for the lesson (for the individual assessment tasks), one 30-minute lesson, and 15 minutes for a follow-up lesson (for students to revisit individual assessment task). Timings given are only approximate. Exact timings will depend on the needs of the class.

Before the lesson
Assessment task: Grouping Shapes (15-20 minutes)
Have students do this task individually in class a day or more before the formative assessment lesson. This will give you an opportunity to assess the work, and to identify any student misconceptions. You will be able to target your help more effectively in the follow-up lesson. Depending on your class you can have them complete the assessment task in whole group or small groups (they should still work individually).

Frame the Pre-Assessment
Give each student a copy of the assessment task *Grouping Shapes*.

> *Today we are going to learn about grouping like shapes. This will help me learn about the ways I can help you if you are having any problems counting. If you don't know all of the answers, it is okay. We are going to do an activity that will help us get better at recognizing shapes.*

It is important that the students are allowed to answer the questions without your assistance, as far as possible.

Students should not worry too much if they cannot understand or do everything, because in the next lesson they will engage in a similar task, which should help them. Explain to the students that by the end of the next lesson, they should expect to answer questions such as these confidently. This is their goal. It may be helpful to make anecdotal notes as students are working the task.

Assessing students' responses
Collect students' responses to the task. Make some notes about what their work reveals about their current levels of understanding, and their different problem-solving approaches. Partner/Group students with others who displayed similar errors/misconceptions on the pre-assessment task.

We suggest that you do not score student's work. The research shows that this will be counterproductive, as it will encourage students to compare their scores, and will distract their attention from what they can do to improve their mathematics. You may want to provide feedback on their work.

Instead, help students to make further progress by summarizing their difficulties as a series of questions. Some questions on the following page may serve as examples. These questions have been drawn from commonly identified student misconceptions.

We suggest that you write a list of your own questions, based on your students' work, and misconceptions, using, but not limited to, the ideas that follow. You may choose to write questions on each student's work. If you do not have time to do this, select a few questions that will be of help to the majority of the students. These can be written on the board at the end of the lesson before the students are given the post assessment task.

Below is a list of common issues and questions/prompts that may be written on individual initial tasks or during the collaborative activity to help students clarify and extend their thinking.

Common Issues	Suggested questions and prompts
Student mistakes a square for a cube or a cube for a square	How do you know the difference between a solid shape and a flat shape? Why do you think it's a cube? How can you tell it's a square?
Student mistakes a square for a rectangle	What makes a square different than a rectangle? Are the sides the different or the same?
Students often mistake a change in size or orientation of a shape as a change in the name of the shape.	How many sides does a triangle have? Does it still have 3 sides? Do the shapes have the same number of sides? Can shapes be large or small?

Suggested Lesson Outline

Collaborative Activity: Sorting and Grouping Shapes (use with work mats) (30 min.)
Strategically group students based on pre-assessment data in to groups of two or three. With larger groups, some students may not fully engage in the task. Group students with others who displayed similar errors/misconceptions on the pre-assessment task.

Give each group the attribute mats and various shape blocks, both flat and solid. Real life shapes would be helpful.

Introduce the lesson carefully:

> *I want you to work as a team. Take turns placing a shape onto the work mat where it belongs. Each time you do this, explain your thinking clearly to your partner(s). If your partner disagrees with your match, then challenge him or her to explain why. It is important that you both understand why the shape belongs on the work mat. You might have shapes that do not belong on any mat. Take your time to complete the task.*

Your tasks during the small group work are to make a note of student approaches to the task, and to support student problem solving. As you monitor the work, listen to the discussion and help students to look for patterns and generalizations.

Make a note of student approaches to the task
You can then use this information to focus a whole-class discussion towards the end of the lesson. In particular, notice any common mistakes. For example, students may confuse shapes such as cube and squares.

Support student problem solving
Try not to make suggestions that move students toward a particular approach to the task. Instead, ask questions to help students clarify their thinking. Encourage students to use each other as a resource for learning.

If one student has placed a shape on a particular mat, challenge their partner to provide an explanation.

If you find students have difficulty articulating their decisions, then you may want to use the questions from the *Common Issues* table to support your questions.

If the whole class is struggling on the same issue, then you may want to write a couple of questions on the board and organize a whole class discussion.

Alternating Work Mats
As students continue working together to complete the work mats (#1-5), make changes to the work mats by substituting a new one. You might also add different shape cards for students to try sorting.

Do not allow students to take shapes off of the mats they were working on previously. Allow students to decide if there is a better placement for their shapes. It is important for students to realize that some shapes can be flat as well as a square, etc.

Placing Work mat #6
As students have completed working with mat #1-5 and can explain their work, hand out the Venn Diagram work mat. Continue to monitor and listen to discussion.

Taking two class periods to complete all activities
If you have to divide the lesson into two class periods, you may want to have a way for students to save the work they have done with sorting their shapes. You may give each group a chart paper or poster board and have them tape the shape cards down. You may choose to have them do this even if you are not dividing up the class period just to use as a visual during the class discussion.

Sharing Work (10 min)
When students get as far as they can with sorting the shape cards, allow groups to compare their matches to other groups. Students are permitted to ask questions and make changes to their original decisions.

Extension activities
Students who finish quickly and show understanding can use attribute shape blocks to sort (big, small, by colors, by shape, by thickness)

Plenary whole-class discussion (10 min)
Conclude the lesson by discussing and generalizing what has been learned. The generalization involves first extending what has been learned to new examples, and then examining some of the conclusions the students came up with.

Allow groups to bring up some of their work samples and share why they placed their shapes in certain mats.

Ask students:
Which shapes were easy to sort? Why?
Which shapes were hard to sort? Why?

Improving individual solutions to the assessment task (10 min)
Give the students a new copy of the shape cards.

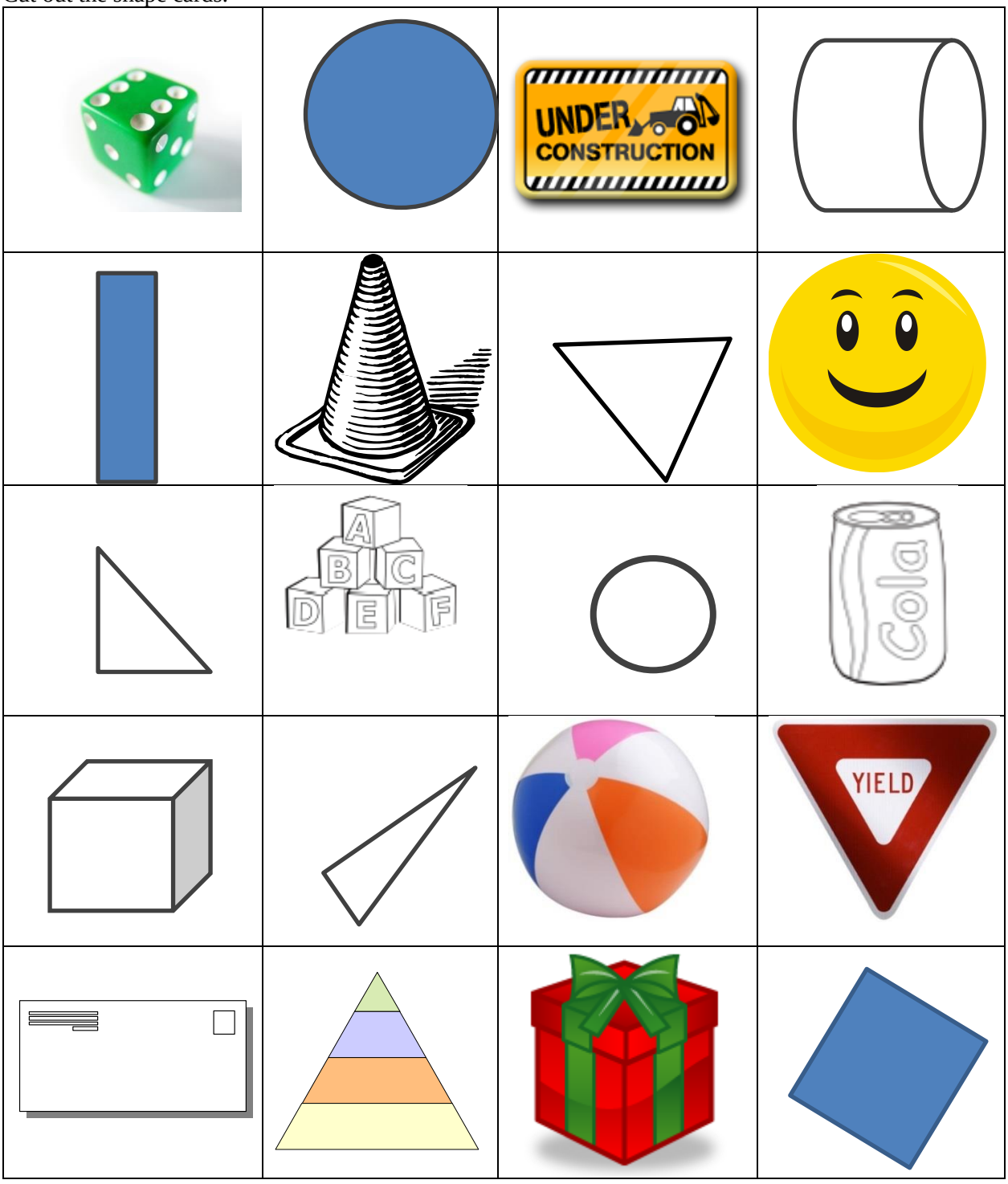
> *Think about what you have learned during this lesson.*
> *Using what you have learned, try to improve your work.*

To focus your students, refer to the common issues chart. Use the questions which reflect the greatest needs of your students. You may choose to share these aloud with the whole group, ask them of individuals as you move around the room, or work with small groups.

Name_____

Grouping Shapes Cards

Cut out the shape cards.



Work mat #1

Flat Shapes

Work mat #2

Solid Shapes

Work mat #3

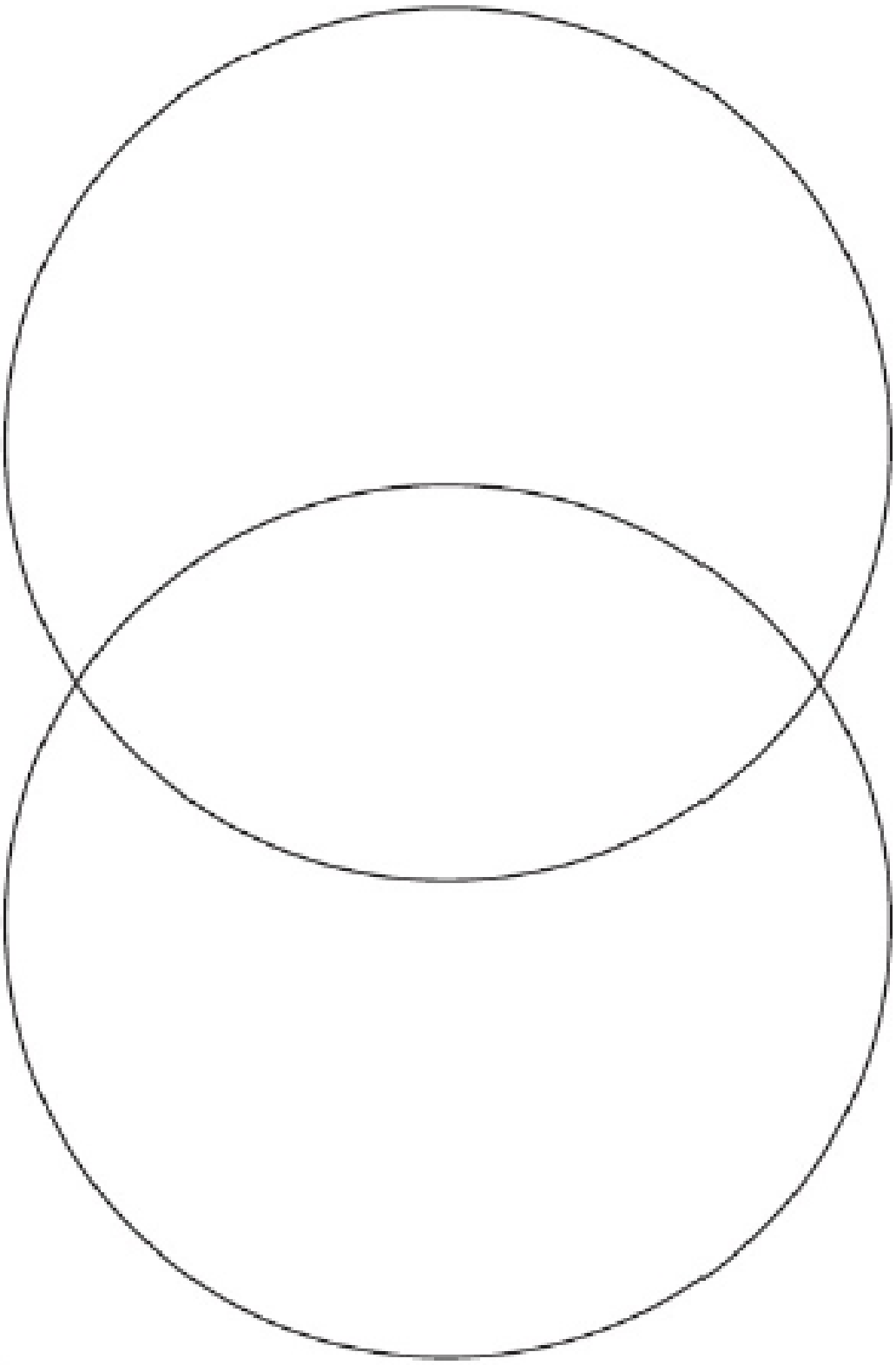
Shapes with 3 sides

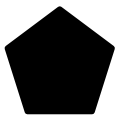
Work mat #4

Shapes with 4 sides

Work mat #5

Shapes with no sides





CONSTRUCTING TASK: PATTERN BLOCK PICTURES

Approximately 2-3 days

Back To Task Table

STANDARDS FOR MATHEMATICAL PRACTICE

MGSEK.G.2 Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

MGSEK.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

Although this task may seem like play, it provides for a great deal of exploration and assessment opportunities. Students begin to connect shapes to real life as they create replicas of what they have seen from real world experiences. Teachers may also begin to assess their students' ability as it relates to counting and cardinality.

ESSENTIAL QUESTIONS

- How can a shape be described?
- How do shapes fit together and come apart?

MATERIALS

- Pattern blocks (in bags for each student)
- Construction paper or die cuts of pattern blocks (1 bag per student with enough to create picture)
- Construction paper
- Pattern Block Picture recording sheet
- Writing Paper
- Glue sticks (1 for each student)

(The bags should contain enough shapes so that students can easily make a picture with 12 shapes.)

GROUPING

Small Group and/or Partner

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Comment:
Formal discussions about a trapezoid have not necessarily occurred in kindergarten; therefore, the red piece (trapezoid) may not be familiar to your students. It is okay to introduce the more specific name for these shapes, but Kindergarteners do not have to master identification of these shapes. Keep in mind a Kindergartener does not have to be able to identify a shape as a trapezoid, but should be able to classify it as a quadrilateral through exposure in previous tasks.

Part I
Distribute zippered plastics bags that contain the pattern blocks. Have students explore and identify what smaller pattern blocks can be combined to compose a larger shape. (Example: 2 small triangles make a rhombus.) Ask the students if any of them can compose a square from smaller shapes. Students may share shapes with one another if they choose to. This should not be teacher directed and the decision to combine/share shapes should be solely that of the students. As students discover new relationships between shapes the teacher records them on chart paper (SMP 1,4,5,6).

Part II
Have students create a picture using at least a dozen of the pattern block shapes. Encourage students to combine multiple pieces so that the picture is made up of pattern block shapes touching. After students have created a picture using the pattern blocks, have them share their picture. Using the Pattern Block Recording Sheet, have students place a tally mark to record the number of each shape used to create their picture. Repeat these steps until each student has created and recorded the shapes for at least 5 pictures (SMP 1,2,4,5,6,7,8).

Part III
After students have created five pictures and recorded their shapes using the *Pattern Block Picture* recording sheet, have them trace and cut out shapes used in their 5th picture on

construction paper. (example: if a student made a flower with 4 squares and a hexagon they would cut those shapes out of construction paper.) Once students have cut out the shapes that match the ones used in their picture they recreate the picture and glue it down to construction paper. (SMP 1,5,6)

Part IV
After the *Pattern Block Picture* recording sheet and picture are complete, have the student create questions about their own shape chart and create a graph about their picture. "Which shape did you have more/fewer of? How many more/fewer?"
Students can use the data collected from their 5 pictures or they can come together in small groups and combine the recording sheets to create a graph. (SMP 1,2,4,5,6,7,8)

Part V
As a class, have students/groups share their pictures and graphs. As part of the sharing time, have each group identify what shape they used the most of/least of. (SMP 1,2,4,5,6,7,8)

TEACHER REFLECTION QUESTIONS

- Are students able to create pictures using various pattern blocks
- Are students able to identify the shapes in their pictures?
- Are students able to collect, organize and report their data?

FORMATIVE ASSESSMENT QUESTIONS

- Which shape did you use the most of? Least of?
- What are you noticing about these shapes? What do they have in common? How are they different?
- Did any of your shapes combine to form other shapes?
- Which shapes are easy to combine? Why do you think this? Are any shapes hard to combine? Why? What else did you discover?

DIFFERENTIATION

Extension
- Give students an exact amount of specific shapes that need to be used to create their picture.

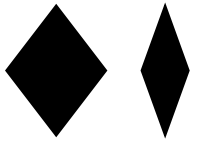
Intervention
- If tracing is too time consuming for some students, skip this part and give them the precut shapes. Ask the student to verbally identify the name of the shape and the number of its sides.

Students can use numerals for the number of shapes used to create their picture as opposed to tally marks.

Back To Intervention Table

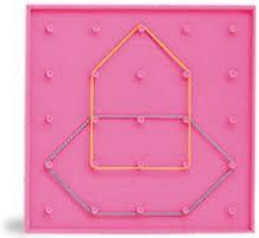
TECHNOLOGY

Patch Tool http://illuminations.nctm.org/ActivityDetail.aspx?ID=27
Description: Students use pattern blocks to create pictures or combine shapes to make new shapes.

					
Picture 1					
Picture 2					
Picture 3					
Picture 4					
Picture 5					

Pattern Block Picture

PRACTICE TASK: Geoboard Museum



Approximately 1 day Back To Task Table

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

To help students in the very early grades copy geoboard designs, suggest that they mark the dots in the corners of their shape. Encourage students to say the name for each peg, such as "second row, end peg" as they point to their geoboard. This will allow them to match the corresponding dot on the task sheet. Because a standard for ordinal words is not explicitly stated in the MGSE, they should be integrated whenever possible.

ESSENTIAL QUESTIONS

- What makes shapes different from each other?
- How do shapes fit together and come apart?

MATERIALS

- Geoboards
- Rubber bands

GROUPING

Individual, small group and/or math work station

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Gather the students together to discuss the characteristics of shapes. How are they alike? How are they different? Have students focus on the number of sides as a way to describe a shape. Give students geoboards and rubber bands. Allow students time to explore the different shapes that can be made with the rubber bands. As students explore with the rubber bands and geoboards, ask "What happens if we combine more than one shape on the geoboard? For example, if I put two triangles together what does it look like?" (SMP1-8)

Part II
Read the *Greedy Triangle* by Marilyn Burns to students and have them model the shape as it transforms throughout the book. After reading the story, have students model the multiple ways that shapes can be represented (be sure to include conversation about the difference appearance of shapes such as an "upside down" triangle). Students share the different shapes they have created. Discussions should include conversations about how the students have created their shapes. (SMP 1,3,4,5,6,7,8)

Part III
Completed geoboard designs are displayed in the classroom as Geoboard Gallery. The teacher should label each geoboard with a number. Model for students how to record the shape using dot paper. Provide each student with a student task sheet and have them record what shapes they see in each picture at the museum. This part of the task will require very clear directions and modeling. You may want to take pictures for future activities. (SMP1-8)

TEACHER REFLECTION QUESTIONS

- We want students to be able to create both abstract designs and multiple shapes.
- Observe students as they create designs to see which students have figured out how to make designs using multiple shapes and/or use shapes to make abstract designs.
- Can most students make quadrilaterals and triangles?
- Are they sharing their findings?
- Can they create multiple shapes within their design?

FORMATIVE ASSESSMENT QUESTIONS

- What shapes did you create on your Geoboard?
- Were you able to make a picture on your Geoboard?
- What shape could you not create on your Geoboard?

DIFFERENTIATION

Extension

- Have students create a design that combines three or more shapes.
- Have students create their own geoboard card for other students to copy.

Intervention

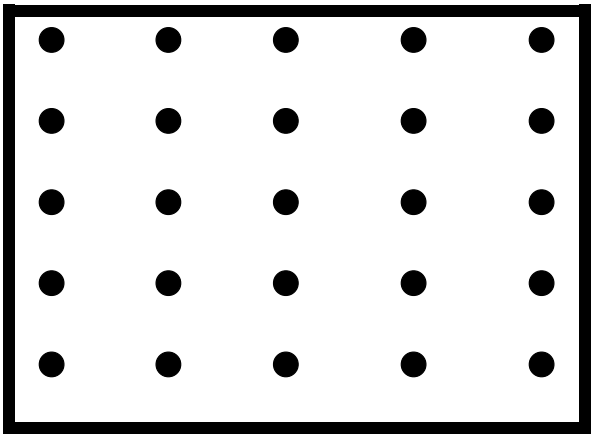
- Some students may struggle with creating shapes on the geoboard. These students can be given cards that have examples of geoboard designs to copy, or provide them with toothpicks and marshmallows to demonstrate/build what would be happening on the geoboard.

Back To Intervention Table

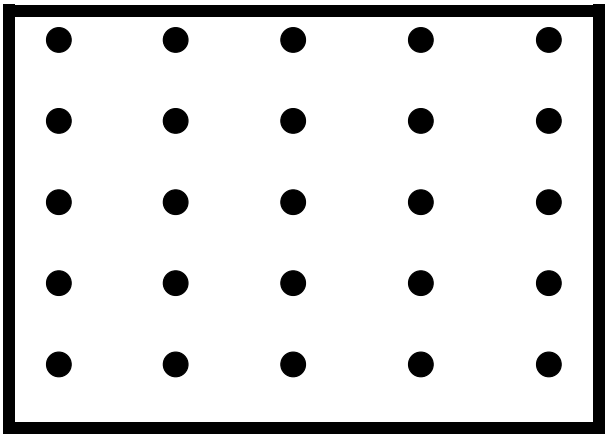
TECHNOLOGY

Investigating Geometry Concepts on GeoBoards https://www.nctm.org/Classroom-Resources/Illuminations/Interactives/Investigating-Geometry-Concepts-on-GeoBoards/
Students use virtual geoboards and rubber bands to investigate and create different shapes.

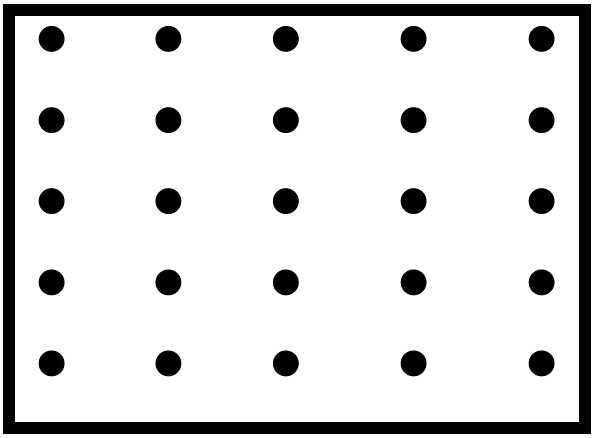
Geoboard Museum



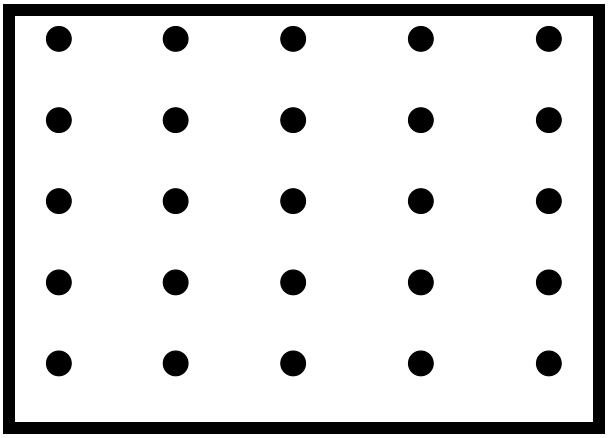
Gallery _____



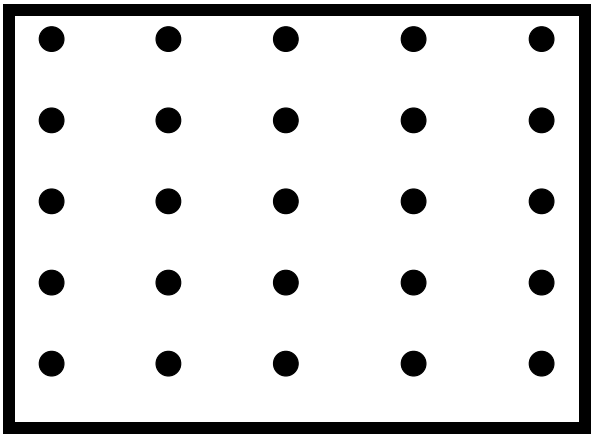
Gallery _____



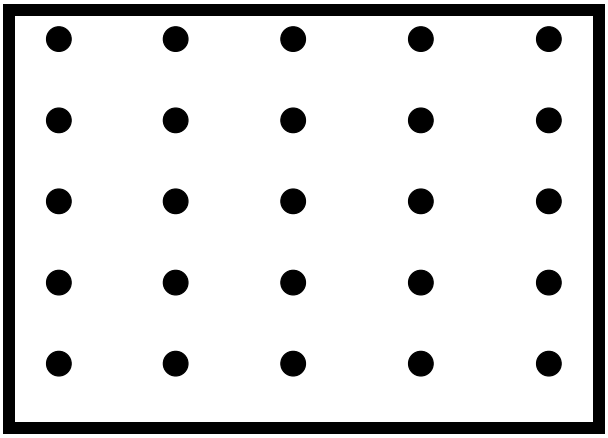
Gallery _____



Gallery _____



Gallery _____



Gallery _____

CONSTRUCTING TASK: Build a Marshmallow Shape

Approximately 3 days

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

MGSEK.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

The students should have prior knowledge of solid geometric shapes and the vocabulary used to describe these shapes. Students will draw and name solid geometric shapes of a cube, cylinder, sphere, and cone and list the number of faces, edges, and vertices/corners of each figure.

ESSENTIAL QUESTIONS

- How do shapes fit together and come apart?
- How can a shape be described?

MATERIALS

- Toothpicks
- 1 piece of construction paper for each student(black)
- Index cards
- Mini marshmallows (see task for choice)
- Bowls
- Small zippered plastic bags (1 per student to be used for investigation)
- *The Shape of Things* by Dayle Ann Dobbs

GROUPING

Large Group and/or small groups

TASK DESCRIPTION, DISCUSSION AND DEVELOPMENT

Comment: As students make a square, accept both rectangle and square as an answer. Discuss that squares are special rectangles that have all sides the same length. Then ask, "How could we use marshmallows and toothpicks to change this shape so that it is still a rectangle but it is no longer a square?" ***(Note to teacher: Remember, not all rectangles are squares, but all squares are rectangles!)***

Part I
At a central meeting place, hand each student three toothpicks and marshmallows. Allow students to explore using toothpicks and marshmallows to create a line segment. This should be a quick discussion and exploration because students are going to have an extended time to create shapes in the next part of the task. Ask students what shape they could build using the 3 marshmallows and toothpicks. Allow every student the opportunity to explore and build the triangle. (SMP1,3,4,5,6)

Part II
Divide the class into groups. Place marshmallows and toothpicks in bowls on each table. Emphasize that their sculptures are going to be displayed. They will be responsible for explaining the process for making the sculptures to others. Allow groups to build as many different sizes and types of shapes as possible. Each time a new shape is constructed, it is placed in the middle of the group for other members to practice constructing. However, there should be no duplication of a shape in the center of the group. Once a new shape has been composed everyone in the group must complete that shape before moving on to discover a new one. This is an excellent opportunity for students to collaboratively work, helping one another to work through a task.

At this point students might only be making flat shapes. Be sure to tell the students that they **can make any shape they want** as long as they can describe what it is and how they made it. If students do not begin to build 3-D shapes, probe through questioning and guidance.

Comment: As students begin to build "solid"/3-D shapes, it is suggested to let them build as big as they possibly can. Bigger shapes will require more problem-solving and structural support. Students will be unable to make a circle using the marshmallows and toothpicks but should be challenged to attempt making one. Encourage students to justify their opinion either way. This could be an excellent intro to a class discussion.

To draw to a close, have students label the names of their shapes on the index cards provided. Once all shapes have been labeled, have the students perform a gallery walk around the classroom to observe and mentally capture the shapes that other groups constructed.

As the gallery walk is taking place, students should discuss which shape models are common groups and which models can be added to their collection when they return. Students can also compare which group has created the most shapes.

After completing the gallery walk, allow groups the time to construct/add some of the new found shapes to their collection. After time has been given to the groups to add shapes, ask the students what information they would like to graph about the shapes constructed (most shapes, least shapes, etc…). Have each group of students share the list of shapes they made, create a bar graph, and discuss the results with students.

- How many groups made a cube?
- Which shape was made the most?
- Which shape was made by the fewest groups? (SMP 1-8)

TEACHER REFLECTION QUESTIONS

- Are students to create shapes using marshmallows?
- What shape was the most difficult for students to create?
- Are students able to identify the similarities and differences between the shapes they created?

FORMATIVE ASSESSMENT QUESTIONS

- How many toothpicks would you need to build a _____?
- What makes shapes different from each other?
- How do shapes fit together and come apart?
- How are these shapes different from one another? How are they alike?
- What is the difference between flat and solid?

DIFFERENTIATION

Extension

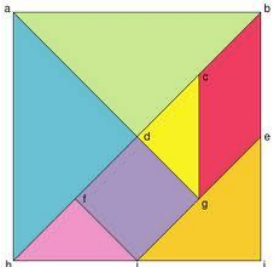
- Have students create the largest possible 3-dimensional shape they can make.

- Have students make different types of triangles (scalene, isosceles, right, equilateral), and quadrilaterals (rectangle, square, rhombus, trapezoid, etc….). The key here is that shapes must be different not by size but by attributes.

Intervention

- Allow students to use straws or pipe cleaners to create shapes.
- Give students models of the shapes and have them reconstruct the shape they see.

Back To Intervention Table



PRACTICE TASK: Tangram Challenge

Approximately 1 day Back To Task Table

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

"Children need to freely explore how shapes fit together to form larger shapes and how larger shapes can be made from smaller shapes" (Van de Walle p. 196). Van de Walle, NCTM and numerous other resources provide supplementary material for tangrams that allow students to explore the composition and decomposition of shapes.

ESSENTIAL QUESTIONS

- How do shapes fit together and come apart?
- How can shapes be sorted?

MATERIALS

- Tangram puzzle set – one for each child
- Tangram Challenge Recording Sheet
- Example of completed tangram picture
- *Grandfather Tang's Story* by Ann Tompert and Robert Andrew Parker or similar literature connection
- *Three Pigs, One Wolf and Seven Magic Shapes* by Maccarone and Neuhaus and *The Tangram Magician* by Lisa Campbell Ernst.

GROUPING

Individual, small group and/or math work station

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
To introduce this task, *Three Pigs, One Wolf and Seven Magic Shapes* by Maccarone and Neuhaus, *The Tangram Magician* by Lisa Campbell Ernst, or a similar book.

Give each student a set of tangram puzzle pieces. Have them name and describe each piece in the set. Have them tell you something about each shape. Allow time for free exploration with the shapes so students can explore how simple shapes can form larger shapes. After time has been allowed for exploration, ask students to create a square using any number of pieces, and then compare the squares with their neighbors. Record the squares by tracing them on a piece of paper, challenging students to make as many different squares as they can. Ask students to define their squares using the attribute of four equal sides.

Display the Tangram Shape Chart and demonstrate to students how to use the chart by placing some of their squares in the appropriate row on the chart. Then have students work in groups to find other shapes that can be made from tangram pieces and sketch those in the appropriate square on the chart. All students are not expected to complete the entire chart (in fact not all shapes are possible). Encourage students to continue to work on this task on their own time and have the students share one of their solutions. (SMP 1-8)

Part II
Next, read *Grandfather Tang's Story*, and point out where/how the tangram shapes are used to build the cat and the man. Distribute the student page with the cat and man designs. Be sure everyone understands the challenges of placing the shapes in the right places to make the correct puzzle. Allow time for students to complete the cat and the man puzzles. Circulate around the room as students complete their tangram puzzles. Ask students to describe their puzzle pieces using the questions below. (SMP 1,3,5,6)

- What shapes are your puzzle pieces?
- What do you notice about all of the triangle pieces?
- What else do you notice about the puzzle piece shapes?
- How did you decide which puzzle pieces to use for each puzzle?

TEACHER REFLECTION QUESTIONS

- Are students able to sort shapes into reasonable groups?
- Are students able to talk about what makes shapes different from each other?
- Are students able to use the tangram pieces to create given shapes in more than one way?
- Are students aware of how shapes fit together and come apart?
- Can students define a given shape by using its attributes?
- Do students recognize how we use shapes in school?
- Have students correctly placed their shapes on the Tangram Shape Chart

FORMATIVE ASSESSMENT QUESTIONS

- How did you count the number of sides?
- How do you know this is a square (rectangle, or triangle)?
- How many pieces did you use to create this shape? Where does this shape belong on the chart? How do you know?

DIFFERENTIATION

Extension

- Have students create their own tangram puzzle picture.
- Ask students to create a new character for the book, Grandfather Tang's Story and make a tangram mat for the character that can be added to the tangram center for classmates to try.
- Have students create the chart as an independent study with sketches of how the figures were created.
- Challenge students to create a trapezoid with 1 to 7 pieces.

Intervention

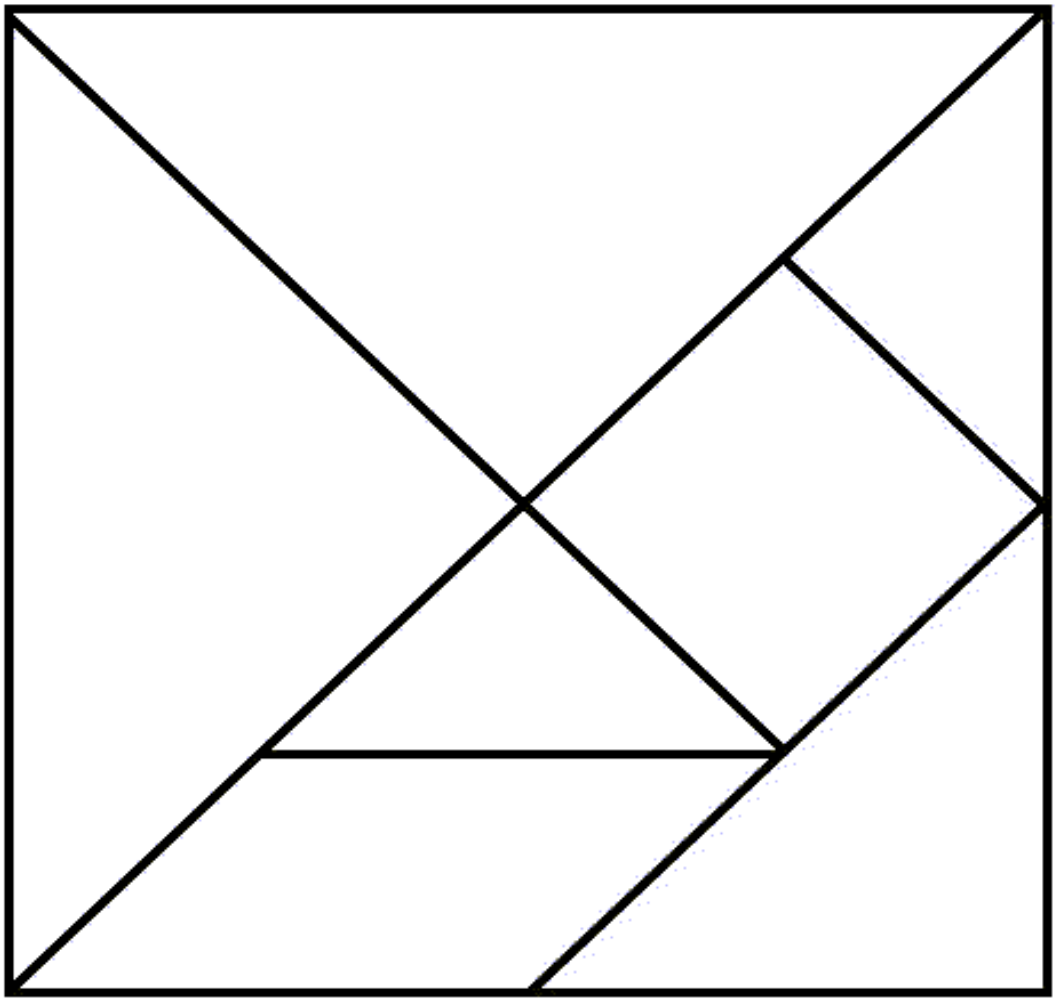
- Have the students work with the tangram pieces to create either more simple pictures or use pictures with details (line segments) filled in.
- For each shape, provide the students the pieces necessary to create that shape.
- Allow student to trace the constructed shape on a separate piece of paper. For more tangram templates visit: www.makinglearningfun.com/themepages/mathtangrams.htm

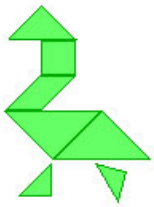
Back To Intervention Table

TECHNOLOGY

Tangrams http://www.abcya.com/tangrams.htm
Students rotate tangram shapes to build 12 different pictures.

Student Tangram Puzzle

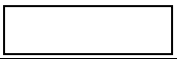
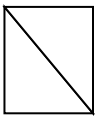


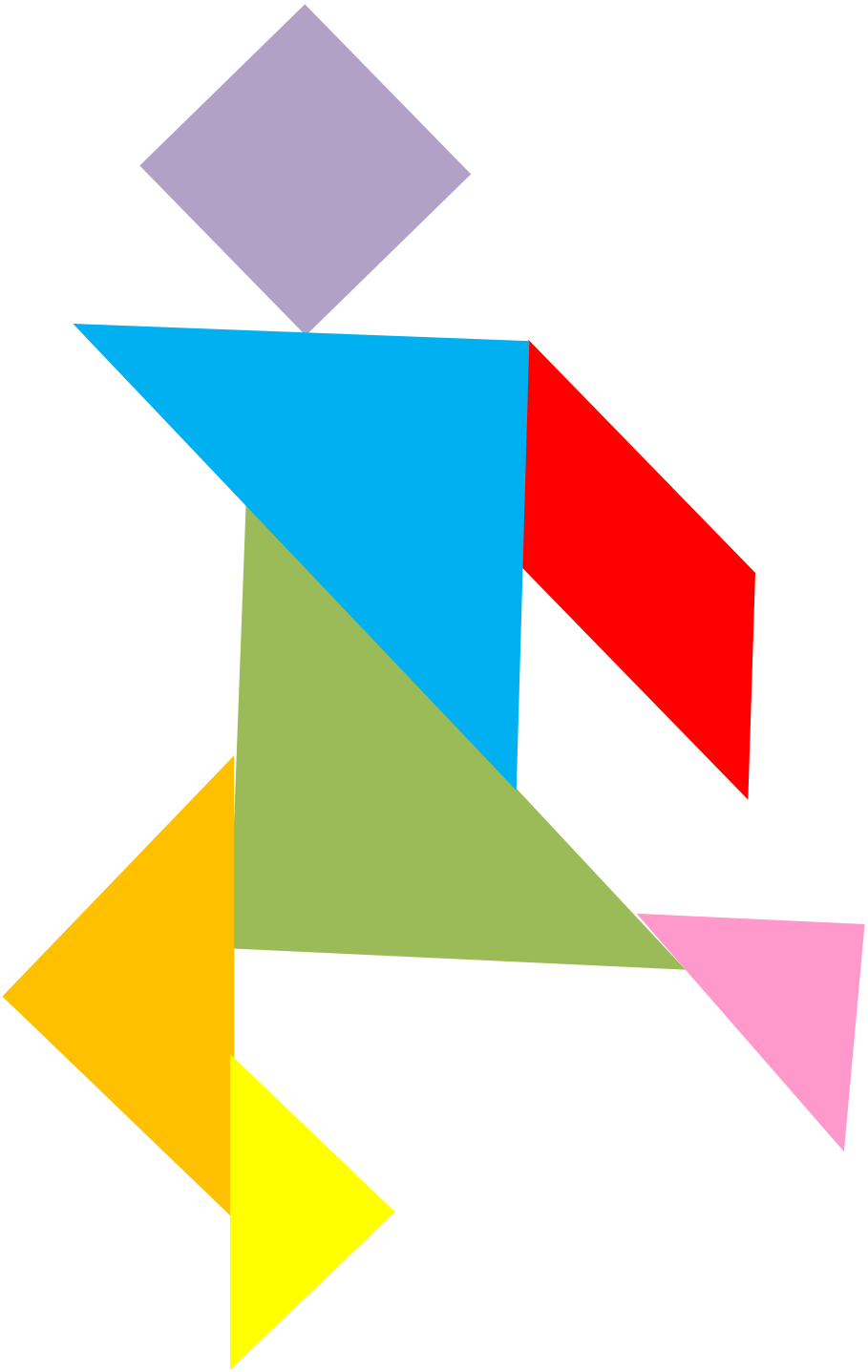


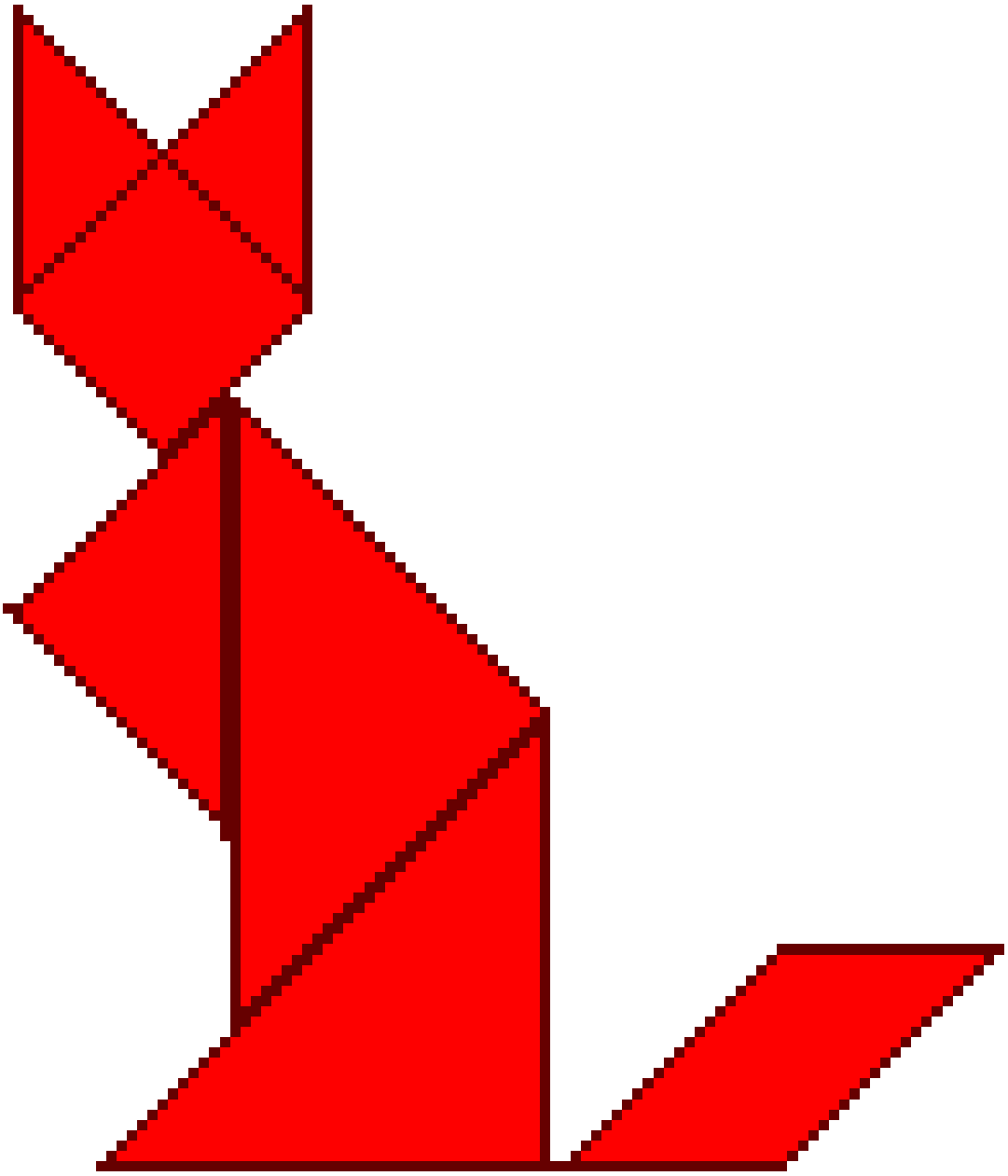
Name _____ Date _____

Tangram Challenge

Find as many ways as possible to create the shapes below using tangram pieces. You may work with a partner or a small group. Sketch how you made the shapes in the appropriate boxes below. See the examples below.

# of pieces	Square 	Rectangle 	Triangle 
1			
2			
3			
4			
5			
6			
7			





CULMINATING TASK: Shapes All Around

Approximately 2 days Back To Task Table

STANDARDS FOR MATHEMATICAL CONTENT

MGSEK.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above, below, beside, in front of, behind,* and *next to*.

MGSEK.G.2 Correctly name shapes regardless of their orientations or overall size.

MGSEK.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").

MGSEK.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).

MGSEK.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.

MGSEK.G.6 Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*

MGSEK.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.

STANDARDS FOR MATHEMATICAL PRACTICE

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

BACKGROUND KNOWLEDGE

This culminating task represents the level of depth, rigor, and complexity expected of all kindergarten students to demonstrate evidence of learning. The ways in which children describe

shapes in "Shape Sorts" and other similar activities with three-dimensional shapes provides insight into their level of geometric thinking.

ESSENTIAL QUESTIONS

- What makes shapes different from each other?
- Where can we find shapes in the real world?

MATERIALS

- Student task sheet
- Digital cameras

GROUPING

Initially in small groups, then individually each student will fill in the task sheet

TASK DESCRIPTION, DEVELOPMENT AND DISCUSSION

Part I
Tell students they will be going on a "field trip" throughout the school and outside to search for examples of the shapes learned in this unit of study. The teacher may start with a "field trip" within the classroom and move to the inside of the building before moving outdoors. Students will record their findings on the student task sheet.

This activity can be done individually but works best if you can break the class up into small groups of 3-4 students and have a monitor with each group that can take digital pictures of the things they see around the school. Then they can sort the pictures on a poster board to be displayed. It is important that students sort the pictures to determine how they should be displayed (if pictures are not available have students draw pictures and label what they saw on the field trip). Students must try and find at least one example of each flat and solid shape. (SMP1,3,4,5,6,7)

Part II
After the poster is complete students can work individually to fill out the student task sheet. Then using modeling clay and toothpicks students should construct one flat AND one solid representation of an object they observed while on their trip and verbally explain how they are different and how they match what they are modeled after. (SMP 1-8)

TEACHER REFLECTION QUESTIONS

- Are students able to identify and describe what makes shapes different from each other?
- Can students recognize the different shapes (circles, triangles, quadrilaterals, spheres, and cubes) in the world around them?

- Are students able to organize the information they gather on the hunt in a clear manner?

FORMATIVE ASSESSMENT QUESTIONS

- Which shape did you use the most of? Least of?
- What are you noticing about these shapes? What do they have in common? How are they different?
- Did any of your shapes combine to form other shapes?
- Which shapes are easy to combine? Why do you think this? Are any shapes hard to combine? Why? What else did you discover?

DIFFERENTIATION

Extension

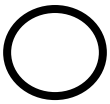
- Have students create the model from modeling clay without looking at the picture.
- Tell students that the shapes on the poster board must be sorted by attributes other than flat/solid or shape.

Intervention

- Limit the number of shapes the students must find on the field trip or give a set list and an area in the school where you know these shapes can be found.

Back To Intervention Table

Shapes All Around

Shape	Picture of Shape (check off)	Where did you find it? Circle and write
		Above below beside behind in front of next to. _____
		Above below beside behind in front of next to. _____
		Above below beside behind in front of next to. _____
		Above below beside behind in front of next to. _____
		Above below beside behind in front of next to. _____
		Above below beside behind in front of next to. _____
solid 		Above below beside behind in front of next to. _____
solid 		Above below beside behind in front of next to. _____
a shape made from shapes		Above below beside behind in front of next to. _____

Name_____

Build (1) 3-dimensional shape you discovered on your journey. Display it here, and label it with the correct name.

My shape is a _____.

Name_____

Build (1) 2-dimensional shape you discovered on your journey. Display it here, and label it with the correct name.

My shape is a _____